THE ARCHITECTURAL FORUM

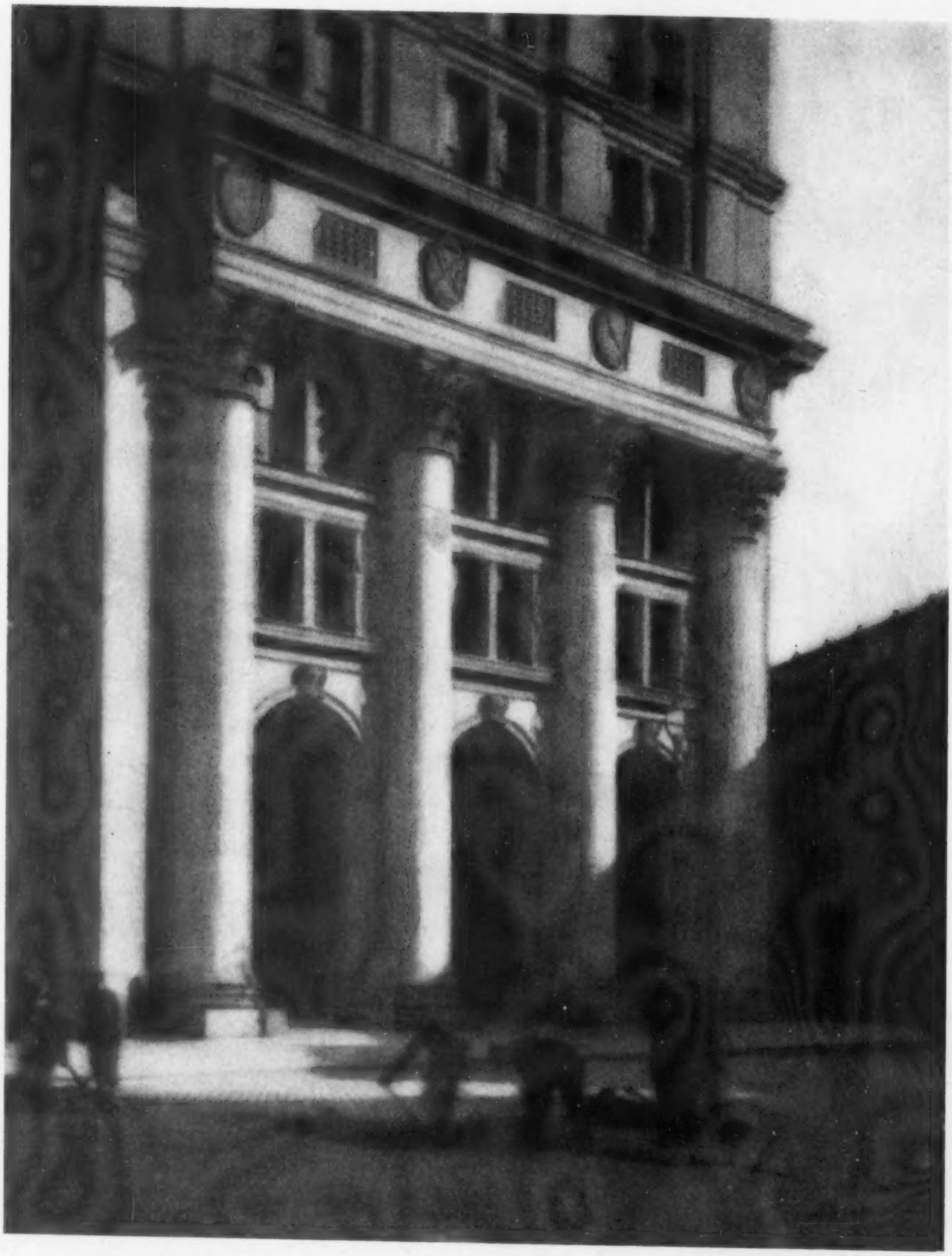
JULY
1919

THE ARCHITECTURAL FORUM

VOLUME XXXI NUMBER 1

CONTENTS for JULY 1919

Published Monthly by
ROGERS AND MANSON COMPANY
85 Water Street, Boston, Mass.
Advertising Department, 103 Park Avenue, New York
Yearly Subscription, payable in advance, U.S.A., Insular Possessions and Cuba $5.00
Canada . . . . . $5.50 Foreign Countries in the Postal Union 6.00
Single Copies . . . . . 50 cents All Copies Mailed Flat
Trade Supplied by American News Company and its Branches. Entered as Second Class Matter, March 12, 1892, at the Post Office at Boston, Mass.



DETAIL OF LOWER STORIES
MUNICIPAL BUILDING, NEW YORK CITY
McKIM, MEAD & WHITE, ARCHITECTS
From photograph by John Wallace Gillies

THE ARCHITECTURAL FORUM
FOR QUARTER CENTURY THE BRICKBUILDER

VOLUME XXXI JULY 1919 NUMBER 1

Architecture of the Dalmatian Coast

PART I

By HAROLD DONALDSON EBERLEIN

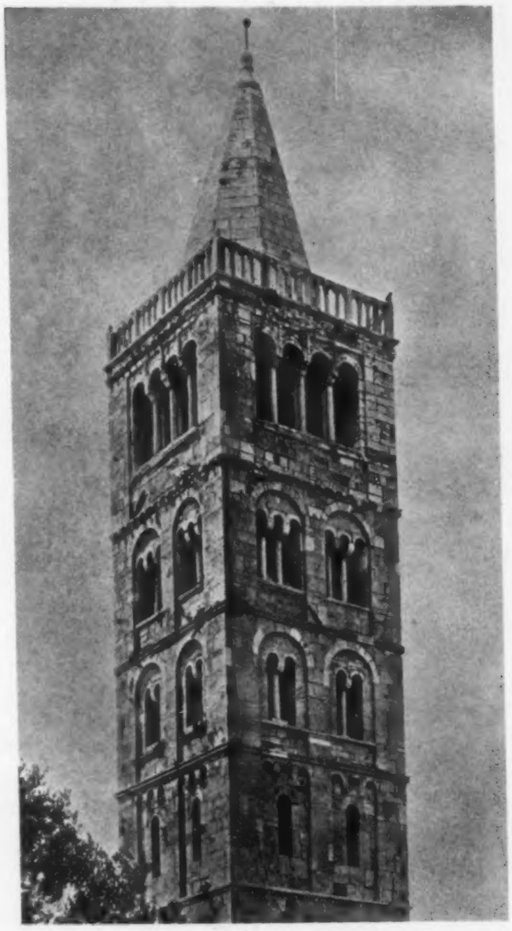
ONCE upon a time there lived an architect, in one of our large Eastern cities, who stedfastly refrained from crossing the water for fear he might unconsciously be influenced by the things he would see and that the individuality of his style would thus be contaminated! Would that he had gone, and would that his style had become *contaminated.* In thirty-odd years posterity has not got used to nor ceased continually to suffer from the monstrosities the *uncontaminated* style of this gentleman evoked.

This true fable — if one may be permitted to call a fable true — has a bearing upon our subject, as we shall by and by perceive. There are three kinds of architects in present evidence: first, enlightened men who know precedent and sanely make use of it as a foundation and guide; second, rigid purists who know precedent and follow it with slavish scrupulosity; and, finally, the group of self-satisfied individuals who know not precedent and endeavor to compound their ignorance by damning what they neither understand nor appreciate.

This third class we have to thank for many of the stupidities daily committed, a set who would make of their studied disregard of precedent a masque to cover their ineptitude and lack of training. The rigid purists who shackle themselves with their pedantic veneration for precedent, and might be termed not only the "copy-cats" but also the "'fraid cats" of the profession, make architecture a process of smug archæology and throttle its influence as a vital creative force, susceptible of development. Such architectural pharisees abet the letter in killing the spirit. Fortunately they are not overly numerous.

Palazzo del Rettore at Ragusa

It is upon the first class, the men who use a broad, appreciative knowledge of precedent and, along with it, their imagination and vision, that we must rely for living architectural expressions of permanent value that both meet the practical requirements of the age and also satisfy a discriminating sense of fitness in outward form. To them precedent is not a trammel but rather an inspiration apt for the most elastic interpretation—not an hectoring schoolmistress but a resourceful friend. Whether consciously or not, they have grasped the essence of genuine originality—a quality that means not *revolution* but *evolution*; a quality that involves a catholic and flexible adaptation of precedent to the living needs of the present day. They have acted upon the sound principle that exclusive adherence to a single model is dangerous while from a multiplicity of models one may learn in safety. Incidentally, they have seized upon the fundamental element of *style*, if by style we understand the *direct attainment of the end proposed without distracting irrelevancies.*



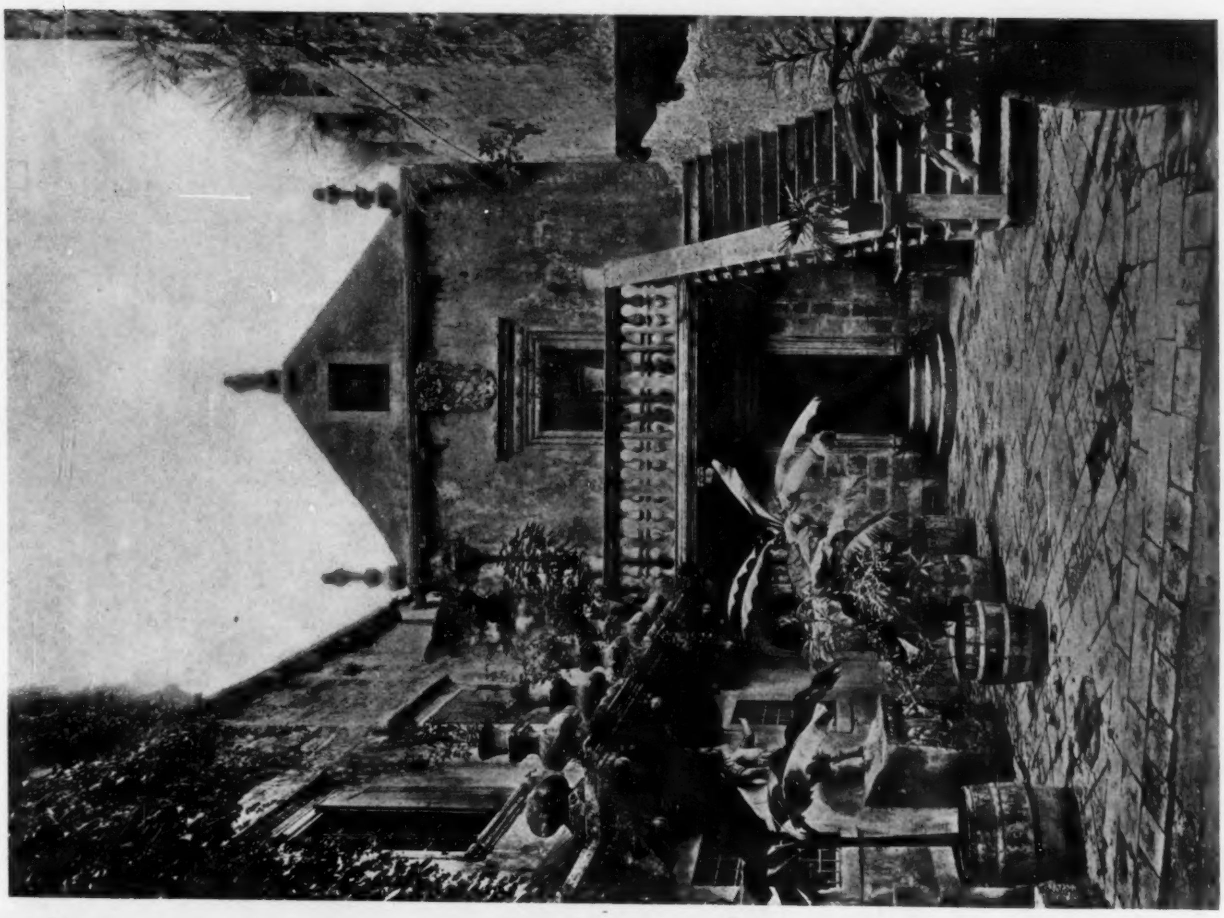
Campanile, Cathedral at Arbe

If we approach Dalmatian architecture with this conception of the nature of originality and this rational estimate of the essence of style in the abstract, we shall find that it has much of value to teach us and that its ministry is by no means confined to a mere polite titillation of one's archæological sense. This positive lesson has three aspects that we may ponder with profit. The first touches *composition*, the second the flexible use of *decorative details*, and the third the extent to which *archæology* may be made a vital factor to architectural practice.

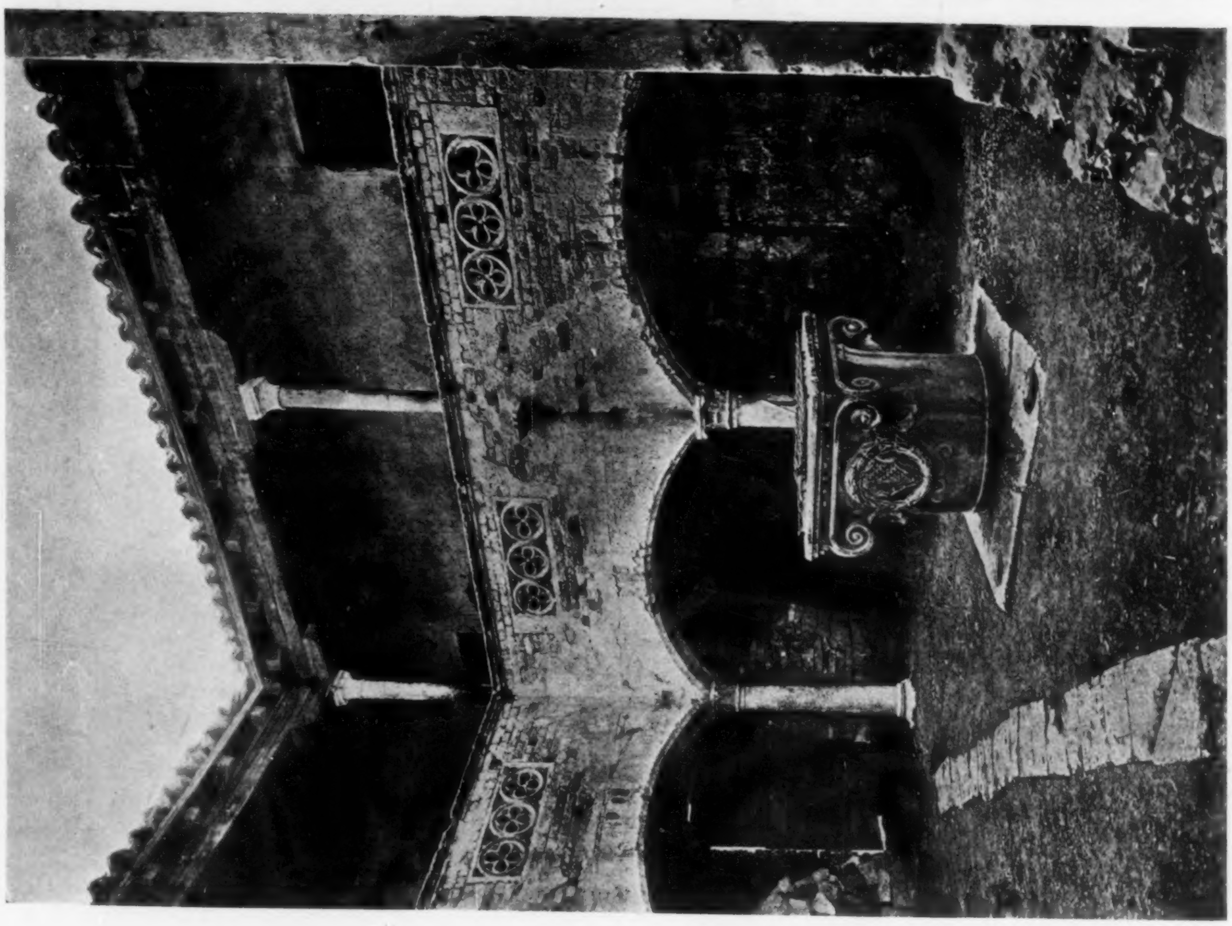
It will conduce not a little to our understanding of the spirit of Dalmatian architecture to take a brief survey of its course before entering upon a specific discussion of any particular examples. Its history may be said to begin with the palace of Diocletian at Spalato, built between 284 and 305 A.D. On the one hand, this building may be regarded as "the last effort of the dying art of antiquity, still majestic in its proportions, still dwarfing into insignificance by its huge masonry the puny works of later ages"; on the other, it seems "the new birth of that rational and unconventional mode of building in which the restless and eager spirit of the regenerated and repeopled Roman world found free scope for its fancy and invention," discovering harmony in variety and recognizing "grace in more than one code of proportions." Both views are correct, for this pile "marks the era when the old art died in giving birth to the new." For the ensuing fourteen centuries the influence of Diocletian's Palace was traceable to a greater or less degree in the structures erected throughout Dalmatia.

The Dogana, Ragusa

During the next seven or eight centuries Dalmatian arch-



CORTILE DI UNA CASA PATRIZIA, CURZOLA, DALMATIA



CORTILE DI UNA CASA CIVILE, ZARA, DALMATIA

Church of S. Salvatore, Ragusa

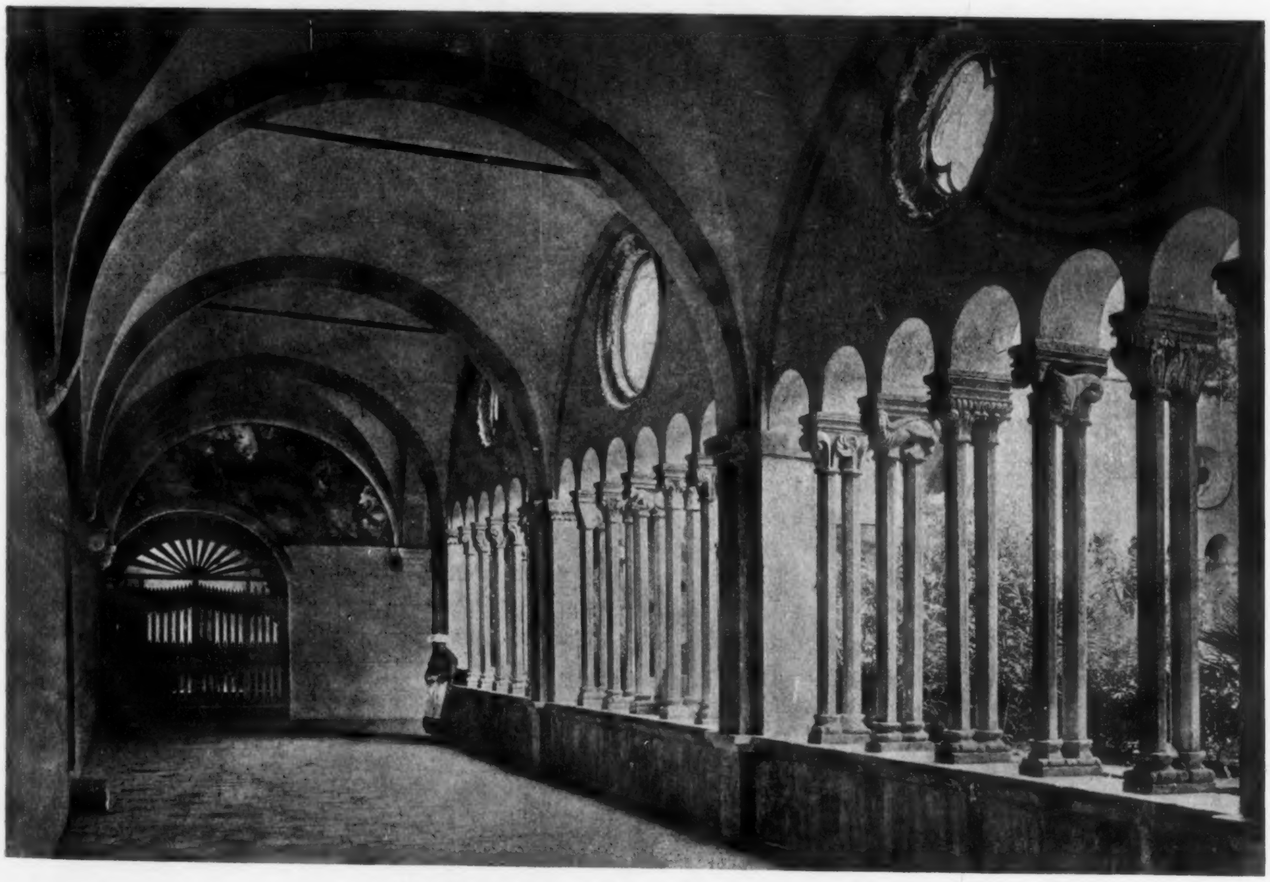
tures the Venetian Gothic influence had a more enduring vogue and has left many admirable examples.

Dalmatian architecture is essentially Italian, as it is but natural it should be. The Dalmatians, whatever foreign racial strains they may have absorbed, were indubitably Italian and so considered themselves. From 1102 to the end of the fourteenth century, although they were politically attached now to Venice and now to Hungary, they were Italian by race and culture. From the beginning of the fifteenth century till the end of the eighteenth, when Napoleon arbitrarily wrenched it away, Dalmatia was an integral part of the Venetian Republic. The architecture everywhere proclaims the Italianity of the country beyond all question. And yet there is so much that is peculiar and distinctive in the Dalmatian type that it deserves to rank as a style by itself. This striking individuality is partly attributable to the potent abiding influence of the remains of Diocletian's Palace at Spalato, partly to the manifold agencies of foreign intercourse through the avenue of Venetian commerce, and partly, though in a far less degree, to whatever French

itecture displayed a strong superposition of Byzantine influence upon a Roman base. At the beginning of the twelfth century, so far as it is possible to establish an arbitrary date, the preponderant Byzantine influence came to an end and the Romanesque style burst suddenly into life with splendid examples. This style retained its ascendency till very late and, with a comparatively few instances of Venetian Gothic intervening — at least so far as public architecture was concerned — merged rapidly into the round arched Renaissance mode of expression. But the Renaissance mode in Dalmatia shows few examples of an advance to the severe formality of pure Palladianism; rather did it preserve the fluid freedom of the Gothic that permeated and enlivened the earlier phases of Renaissance expression, until the seventeenth century when it was supplanted by the Baroque episode. Later than a few buildings of Baroque *provenance*, Dalmatia has nothing of any architectural significance to show. In domestic struc-

Interior of Cathedral at Traù

COURT OF THE CLOISTERS, TRAÙ



CLOISTER OF THE FRANCISCANS, RAGUSA

or other foreign architects the Hungarians may have brought in during their intermittent periods of control, for the Hungarians, though not an artistic people themselves, freely employed artists from other countries. Latinized Slavs often became more Italian than the Italians themselves; but the Slavic element, as a separate race, has left no appreciable trace upon Dalmatian architecture other than destruction.

The Dalmatians displayed a natural and almost precocious receptivity for Renaissance forms and a peculiar aptitude in making use of them. Giorgio Orsini of Zara, who deserves to be reckoned as one of the leaders of the Renaissance movement, and was commissioned in 1441 to finish the duomo at Sebenico, began to put his plans into execution about eight or nine years before the inception of Alberti's work at Rimini, about forty years before Pietro Lombardo's design for Santa Maria dei Miracoli in Venice, and about forty-five years before the Cancelleria in Rome, was begun. One might add considerably to the list, did space permit, and each addition would serve to show that the Dalmatian architects struck out a path of their own with a good deal of independence and were by no means mere copyists.

Cortile of the Palazzo Comunale, Traù

To this independence of initiative it seems not unreasonable to ascribe a certain modernity in Dalmatian architecture, manifest through its freedom and flexibility of interpretation. For this reason, too, it is pregnant with suggestion, not only in the matter of method in the abstract, but also in sundry concrete conceptions that might well serve as patterns for emulation at the present day. The Brothers Adam certainly found the work at Spalato, which exercised such a profound influence upon all later Dalmatian design, a veritable well-spring of direct inspiration.

One of the most impressive examples of Dalmatian public architecture is the Rectors' Palace at Ragusa, a building whose composition well typifies a phenomenon of almost prevalent occurrence in Dalmatia — a state of chronic flux and transition due to two causes. Either the architects did not hesitate in the exuberance of their fancy to employ two or more modes at once and weave them together into an harmonious whole, or else successive architects engaged upon the same building partially retained and partially changed their predecessors' designs.

An instance of the first condition is seen in the Romanesque campanile of Arbe *c.* 1200, where sundry features not usually associated with Romanesque work and altogether traceable to local causes are naively introduced. Similar freedom is still more evident in the apse of the duomo at Sebenico, where Orsini divided the rectangular windows by fluted Corinthian shafts and filled the heads of the lights with trefoil cusps and rich Gothic tracery.

The second condition is admirably exemplified in the façade of the Rectors' Palace at Ragusa where Orsini and Michelozzo, in 1464, when repairs became necessary after a disastrous powder explosion, very materially modified the earlier Gothic design of Onofrio di la Cava by substituting a round arched arcade, with distinctly Renaissance details, for Onofrio's Gothic arcade with pointed arches and a wealth of Gothic sculpture.

DEPARTMENT OF ENGINEERING AND CONSTRUCTION

CHARLES A. WHITTEMORE, ASSOCIATE EDITOR

THE line of demarcation between the profession of architecture and the profession of engineering as pertaining to constructional problems is gradually being erased. In the old days the architect confined himself solely to the problems of designing and constructing buildings, depending upon outside assistance for the more complicated engineering problems. About the same period the engineers, with the exception of those who had made a special study of mill construction and industrial building, were interested in the industrial phases of the problem, leaving out the question of the æsthetic value of the appearance of the structure.

In more recent years architects have established engineering departments in their offices, and engineers have established architectural departments under their control. At the present time there are many organizations of considerable ability who style themselves "architects and engineers."

Whether architecture is a more important factor in building construction than engineering, is a question which permits very little debate. Good architecture has as its very foundation problems of good engineering in order that the building may be constructed along sound structural lines, in order that it may answer all of the requirements of the occupancy, and eliminate what is known as "freak" construction.

Engineers likewise to-day lay considerable stress on the architectural character of the building, not alone for the beauty of detail or the refinement of ornament, but in order that the completed structure may be considered as worthy of its time and place.

It might be easily imagined that the architectural firm and the engineering firm, in solving a problem of the same program and on the same lot, would arrive at the same solution of the problem, but with slight differences in the detail.

THE ARCHITECTURAL FORUM realizes the situation as it exists and is publishing in this number, and will continue in succeeding issues, articles of an engineering character which will be of importance and interest to architects. It is the intention to publish articles dealing with certain phases of engineering work with which architects, as a rule, are not familiar, and to place before architects from time to time items of structural interest.

In this current number appear two articles, one by Ernest W. McMullen of Monks & Johnson, Architects and Engineers, Boston, whose experience in engineering construction has been large and who writes on Concrete Industrial Building. The other article is by Joseph W. Parker, who is connected with Charles T. Main, Engineer, Boston, and who deals with problems from the standpoint of "mill" construction.

The Concrete Factory

By ERNEST W. McMULLEN

IN the past, it has been the custom to give considerably less time and thought to the design of industrial buildings than would be accorded to projects of similar magnitude in domestic and other lines of architectural work; but in recent years, due to the enormous impetus given industrial building by the war, architects have been called upon to perform work in a field that was formerly confined to engineering firms or architects who specialized in this form of work. When the architect who is not familiar with this type of work is commissioned to prepare working drawings and specifications for a factory building, he is immediately called upon to solve many problems that are new to him. The first question that arises is as to the type of construction to employ, —shall it be mill construction, steel construction, or reinforced concrete construction? Many factors enter into the solution of this problem, but it is the intention of this article to limit the discussion to the concrete factory building.

Aside from the problems peculiar to concrete construction that offer themselves for solution in a concrete factory building, there are many that are common to the design of any industrial building. The first consideration is the special requirements of the client. The building must be designed to suit his particular needs, with the proper provisions for machine layouts and the handling of materials from raw storage through the different processes, then to finished storage or the shipping point. In some cases, such as spinning mills, weave sheds and plants with large and heavy machinery, the machine layout will determine the column spacing, required floor heights, and general contour of the building; but any attempt to discuss layouts for different classes of industries would be beyond the limits of this article, and therefore only one problem will be discussed, and it is the one that is most frequently encountered in this field, —the multiple story concrete factory.

The design of a plant manufacturing some small article usually resolves itself into a question of providing sufficient floor space on some particular site, with proper provision for heating, lighting, plumbing, sprinklers and proper accommodations for the employees.

One very important consideration in the plan-

ning of industrial buildings is the provision for future expansion. This must be kept in mind in planning the layout of elevators, stairs and toilet facilities, as well as making provision in the structure to carry any proposed additions.

The type of concrete construction to use in the design is a vital consideration, and the architect should not be influenced too much by various economical claims made for different types of floor construction. This can only be determined by obtaining actual prices, and in some cases such prices will vary considerably from those quoted before the plans are completed. There are three recognized kinds of general concrete construction: beam and girder construction, flat slab construction, and steel skeleton frame with concrete floors, with the steel fireproofed. In the steel frame construction there are different types of floors, such as hollow tile construction and other patented types. These types are also sometimes used with the beam and girder construction.

In recent years practically all of the factory buildings have been designed in the flat slab construction, as this offers many advantages over the other types. However, there are places where the beam and slab construction is more economical, such as irregular shaped panels or long spans. The most economical design in such cases can only be determined by preliminary comparative design and estimates of both types. Some of the most important advantages of the flat slab construction are as follows:

First. This type is most economical for buildings with square or nearly square bays, as the floor form work is simple and the interior column form work is also very economical.

Second. A flat ceiling, besides having the advantage of appearance, offers no obstruction to the passage of light across the building; and as the sash in this type of construction extends to the ceiling, the maximum light is obtained.

Third. A saving in the total height of the building is made with this type of construction, as it is usually necessary to have the same clear height under the beams in the other types.

Fourth. A more economical installation of automatic sprinklers can be made with the flat slab construction than with other types, and this is usually true of the electric lighting system.

Fifth. Shafting and other piping can be erected with the minimum of trouble and expense.

The high cost of structural steel shapes of late years has prohibited the use of structural steel frame buildings, and the flat slab has the same advantages over this type of construction as it has over the beam and girder construction.

With the required amount of manufacturing space determined, and the type of construction decided upon, the final layout is the next logical step. It has been pointed out that the square bay is the most economical in the flat slab construction; and as experience has demonstrated that the width of factory buildings should be about 60 feet, with approximately 12- to 13-foot story heights and two rows of columns equally spaced, this would point to a 20-foot bay as desirable. This spacing of columns in the exterior walls will also lend itself well to architectural treatment. The exterior walls can be made of either brick or concrete, and some excellent effects may be obtained with these materials. It is not the intention to make the claim that such a spacing is the most economical, as that can only be determined by making comparative estimates of different spacings for the same loading conditions; and this is the only method to pursue in the design of concrete storage buildings or warehouses, where the column spacing is not such an important consideration. The most economical spacing might result in a building with the bays too narrow for good results, or a building too wide to obtain the most satisfactory lighting and ventilation.

In a building 60 feet wide, with two rows of columns, excellent light and ventilation are obtained in the exterior bays where the manufacturing is carried on, and the central bay is used for moving and storing material. The position of adjoining buildings is an important consideration in the question of lighting, and sufficient space should be provided to obtain the light on the lower floors of the building. If the building is over five or six stories in height, and the loads are excessive, the columns on the lower floors might be so large that they would occupy valuable space. This can be obviated by using structural steel cores and reducing the size of these columns.

Toilets, lockers and elevator wells should be placed in separate ells outside of the building, keeping the floor space entirely free and clear from end to end of the building.

It has been common practice to cast the roof slab level and build up the pitches with cinder concrete. Recently, however, in flat slab construction, the slab has been pitched and the expense of putting on extra concrete eliminated. If by any chance beam and slab construction is used, however, and the slab is 3 or 4 inches thick, trouble will very likely be experienced with condensation, particularly if there is any moisture in the building. In this case it is better to cast the slab level and use cinder concrete to form the pitches, which will also insulate the slab against condensation.

Any article on concrete factory design would not be complete without some remarks on the question

of floor finish. Until comparatively recently it was generally supposed that concrete floors were injurious to the health of the employees, but of late this matter has not been an important factor in the selection of the kind of floor finish. Some owners have had experiences with poor types of cement top surfaces, and as a result they are prejudiced against this type of finish. The improved method of laying these floors has obtained such good results that practically all concrete buildings built to-day have granolithic floors; and in office portions linoleum is used for the sake of appearance, and to lessen the disturbance to office employees caused by the noise of other people moving about.

A granolithic floor, if properly laid, will not cause any trouble from dusting or cracking. The floor finish should be specified to be placed after the skeleton of the building is finished, so that proper provision can be made for the laying and the protection of the floor. The granolithic finish can be bonded to the slab by chipping or picking the entire surface, removing all laitance, dirt and grease, and then washing with dilute acid, and finally with lime water. The ordinary granolithic finish is specified to be 1 part cement and 2 parts sand, but this is generally the cause of the dusting problem. If a 1 part cement, ½ part sand and 1½ part of ½-inch stone (absolutely free from dust) is used, no trouble should be experienced from wearing or dusting. The sand can be omitted from this mixture and a 1 part cement and 2 part clean stone used; but this finish will show riffles, caused by troweling, which are only objectionable from the standpoint of appearance as they do not affect the wearing qualities of this kind of floor. After laying and finishing, and sufficient set has been obtained, the entire floor must be protected with wood chips sawdust or sand, and kept wet for at least ten days. No ruled joints should be called for as trucking will start to break down the finish at these joints. If the floor is one that is laid on the ground, sand joints can be called for in the lower course, but no joints should be allowed in the top finish.

In most every case steel sash is the most economical and practical for the modern factory, and it is also possible to obtain the maximum light and ventilation — which cannot be accomplished by using double hung or counterbalanced wood sash. In order to obtain economical results, stock sash should be used throughout, and a great many architects have made the mistake of insisting that the steel sash be made to fit certain sized openings. Stock sash can be obtained to fit practically every opening, within 2 or 3 inches of what is desired, and the results obtained from using special sash do not justify the extra expense to the client. Some difficulties may also be avoided by specifying that the steel sash contractor set the sash, and in this way the liability is reduced to one party and no counter claims can be made by the general contractor and the sub-contractor for faulty work in this respect. The lower lights of all factory sash should be plain glass; and on all sides, except the north side, ribbed glass should be used to diffuse the rays of the sun.

Some Prominent Features of Mill Construction

By JOSEPH W. PARKER

MILL buildings of the slow-burning type have been built in this country for nearly one hundred years, and were first introduced in the cotton and woolen mills of New England. Great credit is due the fire insurance companies for many valuable suggestions toward the development and perfection of this type of construction since the early days of the industry. The type at the present time has reached a very high stage of development and has clearly demonstrated its value, when properly designed, both from the standpoint of durability and fire resistance.

DEFINITION. Mill or slow-burning construction, in its most approved form, may be defined as a certain class of building construction in which the floors and roof are constructed of heavy timbers, so designed and laid out as to have large, smooth timbers spaced as far apart as possible, consistent with good design, and supporting heavy planks planed smooth; the interior columns constructed of heavy timbers planed or turned smooth, and the exterior walls constructed of masonry.

WOOD *versus* CAST IRON FOR COLUMNS. In mill buildings, several stories in height, the interior columns in the lower stories are frequently cast iron on account of the large sizes which would be required in timber. This is especially true of buildings which are used for storage purposes, where the loads are usually quite heavy. From the standpoint of fire resistance, cast iron columns, when unprotected, are not as desirable as heavy timber columns. The principal advantages of timber columns are: (1) economy, and (2) greater reliability in case of a prolonged fire. The principal advantages of cast iron columns are (1) less floor area taken up, and (2) less liable to deteriorate with age or with unfavorable conditions.

STANDARD MILL CONSTRUCTION. The so-called "standard mill construction" has heavy wooden floors and roof supported directly by heavy wood

columns for the interior, and substantial brick walls for the exterior. The floor and roof beams extend crosswise of the building; are spaced from 8 to 12 feet on centers; and are supported directly by the columns and the exterior walls. These beams support heavy planks laid flat, and the columns are spaced from 16 to 25 feet on centers, crosswise of the mill. On the floors, a top flooring is commonly laid for a wearing surface, and on the roof, five-ply tar (or asphalt) and gravel (or slag) is most common for covering. A point worthy of attention here is that joisted construction is decidedly *not* standard mill or slow-burning construction.

MODIFICATIONS OF THE STANDARD TYPE. There are several modifications of the standard type which may be described as follows: (1) same floors and roof as standard type, but with cast iron columns in lower stories; (2) steel beams in floors and roof, supported by wooden columns in upper stories and cast iron columns in lower stories; (3) planks in floors laid on edge (the so-called laminated floor), supported by steel or wooden beams spaced from 12 to 16 feet on centers and with cast iron or wooden columns spaced from 16 to 25 feet on centers, crosswise of the mill.

Another type, which is quite different in the floor and roof framing from any of the above, is one which has the planks supported directly by moderate sized wooden beams, spaced from 4 to 10 feet on centers, which in turn are supported by heavy wooden or steel girders, spaced as far apart as the general layout and design of the building will permit. The columns in this type may be heavy timber or cast iron, spaced from 16 to 25 feet on centers, crosswise of the mill.

REASONS FOR MODIFICATIONS OF THE STANDARD TYPE. There are a number of reasons which have been advanced for using the various modifications of the standard mill construction. Cast iron columns have been used for a great many years in all kinds of industrial buildings, although they are a great deal more expensive than wooden columns of equal carrying capacity. The chief reasons for their use are their comparatively small size for relatively large carrying capacity, and they are practically indestructible under ordinary conditions. They are especially well suited for basements or other places which are very damp. An objection to their use lies in the fact that during a fire, streams of cold water from the hose lines, striking on the hot cast iron columns, are apt to crack them seriously, causing failure.

Steel beams have come into use in recent years in slow-burning construction, due largely to the constantly increasing difficulty of securing heavy timbers which are dense and of sufficient length to provide for an economical arrangement of columns and beams. Also, steel beams will provide a stiffer floor than wooden beams, which is especially important in manufacturing buildings. Here again the steel beams are much more durable under ordinary conditions than the wooden beams. Against their use, however, may be mentioned the following: (1) if unprotected, they will fail by buckling or bending during a fire of any considerable duration, resulting in a collapse of the floor or roof much quicker than with heavy wooden beams of equal carrying capacity; (2) the height of the building may be increased, due to the nailing pieces fastened to the top flanges of steel beams, which may add about 6 inches to each story.

Laminated floors have been introduced in recent years with a considerable degree of success, particularly in the Middle West and in Canada. The principal reasons for their use have been the desire to obtain very stiff floors for manufacturing purposes and to eliminate as many interior columns as possible. Also, an important feature is the higher percentage of window area obtained, due to the wider bays with this type of floor. Two possible objections may be mentioned in connection with this type of floor: (1) unless the planks are thoroughly seasoned when laid, there is greater possibility of dry rot starting than in the case of an ordinary floor, due to the relatively large number and area of joints between planks; (2) the floors are considerably thicker than usual and therefore would probably increase the height of the building.

The use of intermediate beams supported by heavy girders has been adopted very extensively through the Middle West. The reasons for the selection of this type are the same as those for the selection of laminated floors. From the standpoint of fire resistance, this type is not as desirable as the standard mill construction, as there are a larger number of corners exposed to the action of fire, and the intermediate beams also prevent a most efficient use of sprinklers or fire hose during a fire.

Another objection to the use of this type is that the exterior windows cannot be placed as high as in standard mill construction. For a building of given width, this would probably mean greater story heights than with standard construction. The intermediate beams also obstruct the rays of light considerably and do not permit any appreciable reflection across the building, as in the case of crosswise girders with no intermediate beams.

Whenever this type is used, the intermediate beams should rest on the girders, instead of being suspended from them by stirrups, which are likely to fail rather early in a fire of some duration.

IMPORTANT FEATURES OF STANDARD MILL CONSTRUCTION. In the best examples of standard mill

construction there is an entire absence of concealed spaces. All parts are fully exposed, so that in case of fire the spray from sprinkler heads or the streams from lines of fire hose will reach every portion. The floor framing is such that the most economical arrangement of sprinkler heads and piping can readily be made. From the standpoint of the sprinkler layout, the ideal width of bay is 10 feet, as the requirements of the fire insurance companies are such that a given number of sprinkler heads will cover a maximum floor area for that particular bay width. Bays as narrow as 6 or 7 feet are very uneconomical in this respect.

All stairways and elevator shafts are enclosed with incombustible walls, and the number of openings in the floors is kept down to a minimum. Wherever such openings are necessary, they are protected by fireproof enclosures or automatic hatches. Large floor areas are sub-divided by means of fire walls, and any necessary openings in these walls are equipped with automatic fire doors on both sides of walls. In this connection it is of interest to observe that the National Board of Fire Underwriters, in their regulations governing standard mill construction, require double the number of fire walls for a building without sprinklers that they require for one equipped with sprinklers.

The best practice in that section of the United States where the slow-burning type has been used the most and for the longest period, namely, New England, indicates that the columns in each story should not pass through the floors. Instead, the load from one column should be transferred to the column in the story below by means of a cast iron pintle. This pintle acts as a short column and very effectively carries the load from one story to another. Due to the high compressive strength of cast iron, especially in short columns, the pintles seldom run more than 4 to 5 inches in outside diameter, and therefore a comparatively small hole has to be bored in the wooden beams. In this construction the beams are butted at ends over interior columns, a small hole being bored out, half in each beam, to allow space for the pintle. The pintles are so comparatively small in diameter that there is sufficient room for two wrought iron dogs, or ties driven into the top surfaces of the beams, one on either side of the pintle, to tie the two beams securely together. Near the top and above the beams, the pintle widens out so as to form a base for the column above. At the bottom the pintle bears directly upon the center of a cast iron cap for the column below. With wooden beams the cast iron pintles, as well as the wrought iron dogs, are surrounded by a considerable thickness of wood, which is a very desirable arrangement from the standpoint of fire resistance. An important feature of this construction is that the beams bear directly over the columns and do not depend upon the projecting seat of the column cap for support. These projecting seats are apt to crack and fail during a prolonged fire, especially when they are supporting any considerable load. In the past it has been the custom to bore a vertical hole through the center of each wooden column, extending from top to bottom, and with connecting horizontal holes near top and bottom for ventilation. It was thought that these holes would prevent checking in columns to a considerable degree, but experience with this method has shown that it is not a success and its practice has been generally discontinued. In the opinion of experts holes are really very objectionable, for the reason that they are natural breeding places for dry rot fungi.

Wooden floor beams rest on cast iron beam boxes or cast iron plates with lugs at the exterior walls. The beam boxes are so designed that they will be well anchored into the walls, and the beams are anchored to the beam boxes by means of lag screws. The ends of beams at exterior walls should be cut on a bevel, so that in case the beam fails during a prolonged fire, it can fall without pulling a portion of the exterior wall with it. In all cases an air space of at least one-half inch should be left around beams where they enter the walls for purposes of ventilation. Where cast iron wall plates are used for floor beams, they should have lugs for anchoring the beams to the walls and also for anchoring the plates to the walls.

Wooden roof beams usually rest on plain cast iron or steel plates at the exterior walls and are anchored directly into the brickwork by means of wrought iron anchors. These beams usually run through the exterior wall, projecting far enough to support the overhanging cornice.

Where it is difficult or impossible to secure single beams of sufficient size, two beams placed side by side are frequently used. Where this is done, each pair of beams should be placed in contact and securely bolted together. The contact surfaces should be treated with a wood preservative, in order to prevent the action of dry rot.

Floor planks, when laid flat, are commonly grooved for splines and vary in width from 5 to 10 inches. The splines should be made of hardwood and should fit tightly in the grooves, in order to distribute any concentrated loads and to aid in stiffening the whole floor. The planks are usually laid continuous over two bays and are so arranged that there are not more than 3 to 4 feet of continuous joints over floor beams. Adjacent to exterior walls one plank should be left out until the building is closed in and the floors dry, to avoid any possibility of the exterior walls being pushed out by the

swelling of the planks as they absorb moisture.

In laminated floors the planks are dressed on all four sides, and two edges beveled for appearance on the ceiling, and are laid on edge close together, each plank when laid being securely nailed with 60 D. wire nails to the adjacent plank. With laminated floors the spans are frequently so long that it would be difficult to obtain planks of sufficient length to span two bays. In such cases the planks are ordered in one-bay lengths and the joints are commonly made at the center lines of beams or at the quarter points of spans, being alternated so that every third plank joints at the beams, thus avoiding continuous joints across the floor and at the same time securing a strong floor. Two planks adjacent to exterior walls should be left out until the building is closed in, for the same reason as stated in the preceding paragraph.

Roof planks are ordinarily laid flat with grooves for splines or tongued and grooved. They are laid continuous for two bays, as in floors, and break joints in the same way. The range in widths of planks is the same as in floors.

Before the top floors are laid it is advisable to place on the plank floors one or two layers of tarred paper or, preferably, waterproof felt covered with an elastic compound. The object of these layers of paper is to keep dust and dirt from working through the floor and also to make the floor as nearly waterproof as possible.

Top floors are usually maple or birch, ⅞ of an inch or more in thickness. They should preferably be laid diagonally with square-edged stock, dressed on four sides. The advantages in laying a top floor diagonally are that it is far superior as a wearing surface and will make a stiffer floor. Top flooring is commonly 5 inches wide and should not be less than 6 feet in length. The nails should be set and the floor planed smooth.

Important Factors Affecting Economy. In designing a mill building, after the most efficient arrangement of machinery has been made, there are many ways in which the cost can be kept to a minimum figure by a careful study of the principal features of the building. Some of the more important of these features are as follows: (1) for the same general construction a wide building costs less per square foot of floor area than a narrow building. In this connection, Mr. Charles T. Main, in a paper entitled, "Approximate Cost of Mill Buildings," writes as follows:

"An examination of the diagrams shows immediately the decrease in cost as the width is increased. This is due to the fact that the cost of the walls and outside foundations, which is an important item of cost, relative to the total cost, is decreased as the width increases."

(2) A one- or two-story building costs more per square foot of floor area than a three- or four-story building.

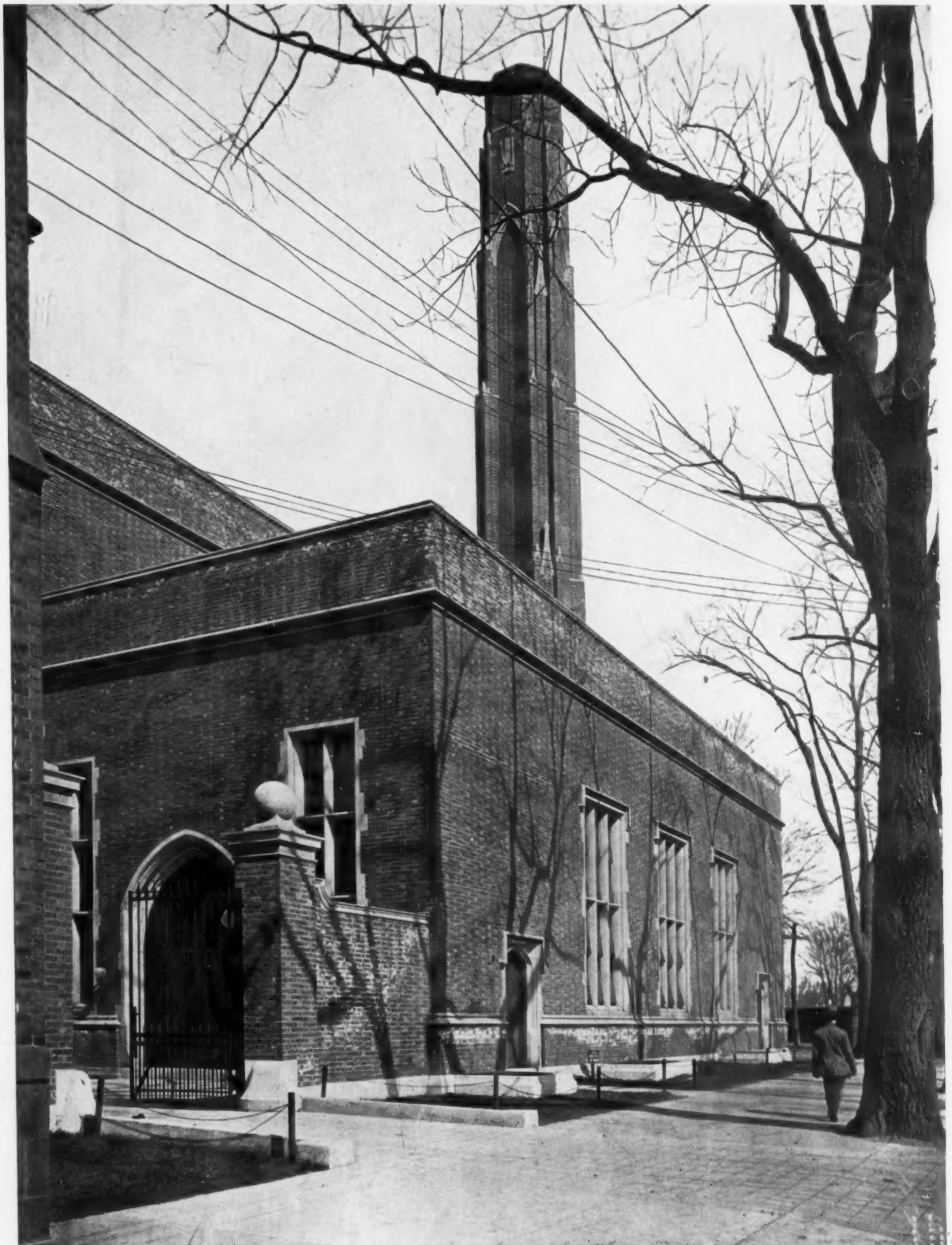
Again, quoting from Mr. Main's paper:

"The diagrams show that the minimum cost per square foot is reached with a four-story building. A three-story building costs a trifle more than a four-story. A one-story building is the most expensive."

In his paper Mr. Main shows diagrams for mill buildings, varying in length and width, and from one story to six stories in height. He assumes the heights of stories as follows: 13 feet high if 25 feet wide, 14 feet if 50 feet wide, 15 feet for 75 feet, 16 feet for 100 feet and over.

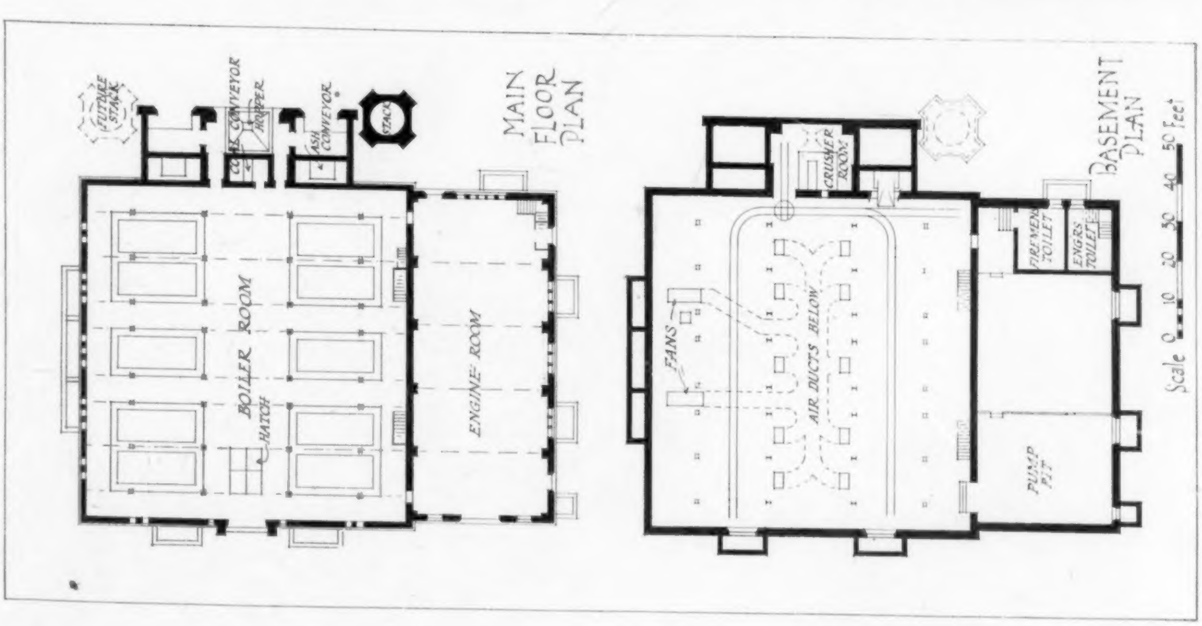
(3) The cost of a building may be kept down by using standard lengths and sizes of timber wherever possible. In laying out the building this factor should be constantly kept in mind. (4) The cost of the sprinkler system may oftentimes be reduced to a minimum, when other factors will permit, by a careful selection of the size of bay. (5) Building ordinances and insurance regulations frequently fix certain minimum sizes of beams and girders and thicknesses of floor plank. Economy may be obtained by laying out the floor framing in such a way that these minimum sizes will be utilized to their full working strength. (6) The exterior of the building may be simplified and unnecessary ornamentation eliminated. The average mill building, for manufacturing or storage purposes, does not require a great deal in the way of architectural features to make it harmonize with its surroundings and with the purpose for which it is to be used. Good proportions, a wise choice of exterior wall material and its proper handling will produce architectural character with practically no increase in expense.

Fire Insurance on Mill Buildings. On account of the many factors which have a part in controlling the insurance rate on any particular mill building, such as: (1) nature of occupancy; (2) proximity and type of adjacent buildings; (3) nature of fire protection; (4) type of construction, etc., it is impossible to give any definite rate which would apply to mill buildings of the slow-burning type, as a whole; but there are some general comparisons which can be made, as follows: (1) other things being equal, the insurance rate on mill construction sprinklered appears to be about the same or slightly higher than the rate on fireproof construction sprinklered; (2) a sprinklered building of the mill or slow-burning type is considered a much safer risk by the fire insurance companies than a non-sprinklered fireproof building, and the same thing applies to the contents of such buildings.



POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

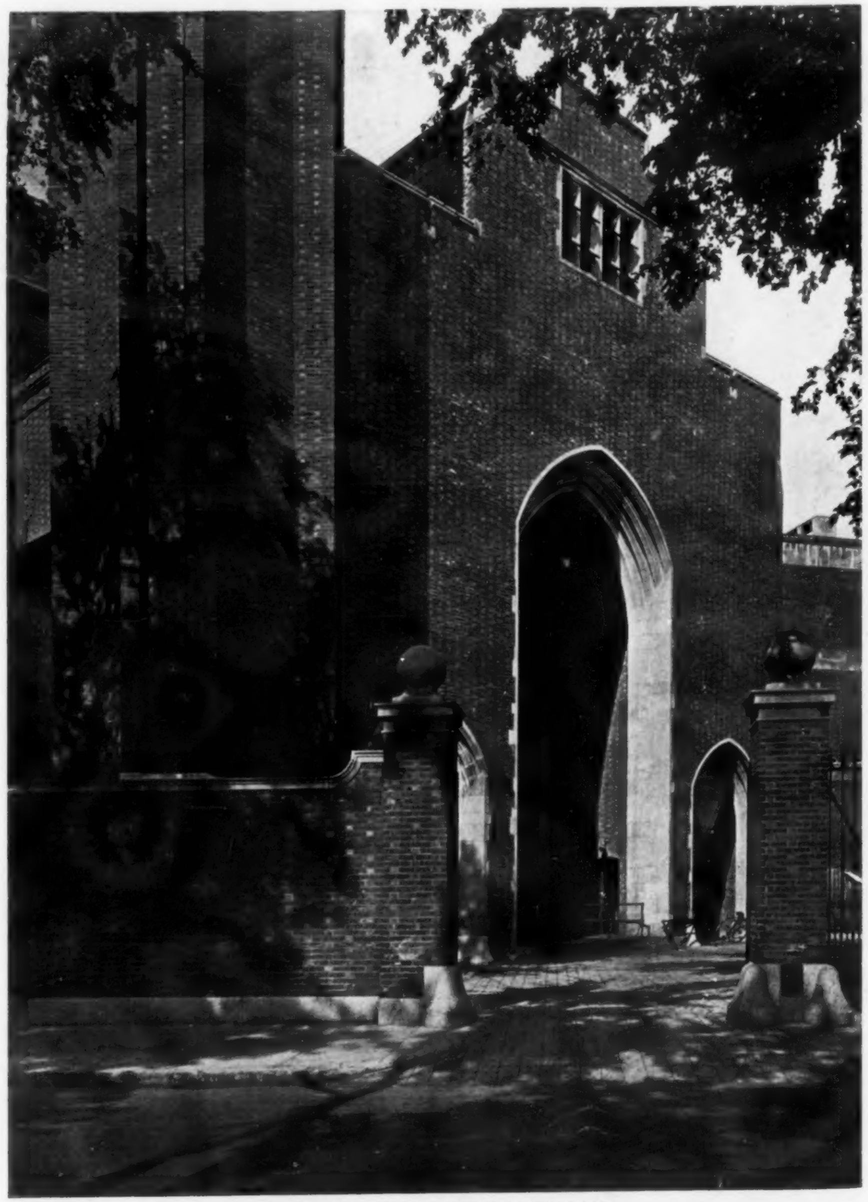
DAY & KLAUDER, ARCHITECTS
HOLLIS FRENCH & ALLEN HUBBARD, ENGINEERS



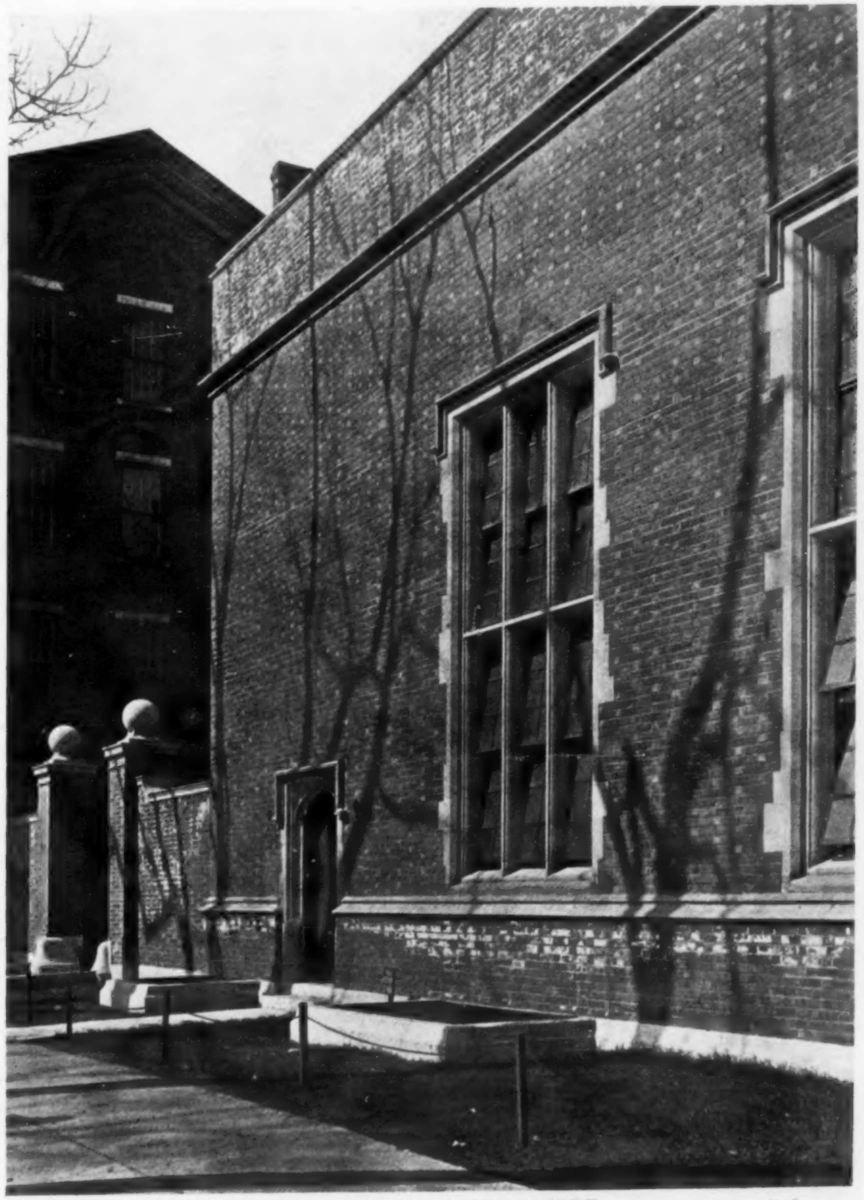
POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

DAY & KLAUDER, ARCHITECTS

HOLLIS FRENCH & ALLEN HUBBARD, ENGINEERS



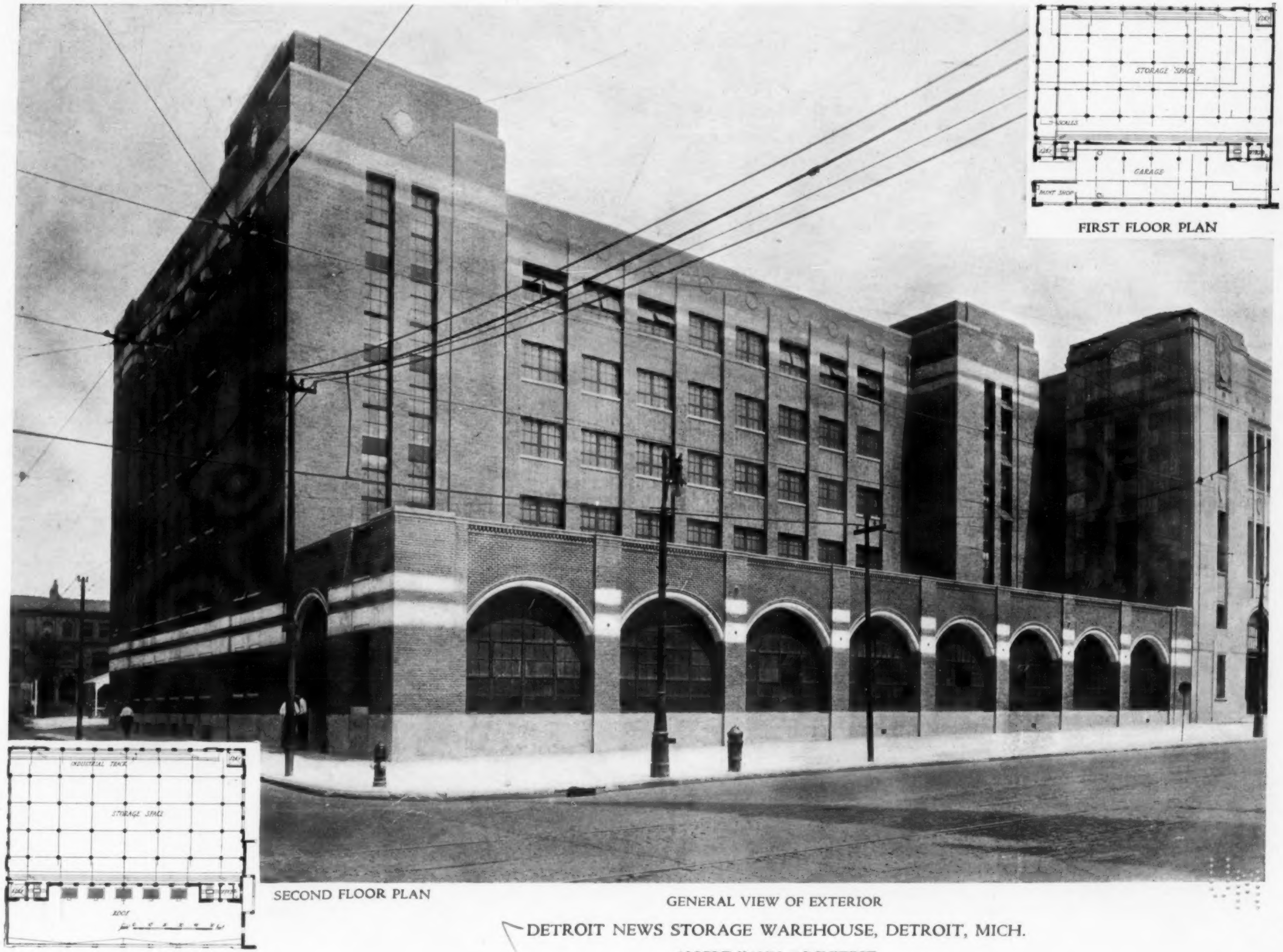
DETAIL OF ENTRANCE TO HOPPERS



DETAIL OF YORK STREET FACADE

POWER AND HEATING PLANT, YALE UNIVERSITY, NEW HAVEN, CONN.

DAY & KLAUDER, ARCHITECTS
HOLLIS FRENCH & ALLEN HUBBARD, ENGINEERS



FIRST FLOOR PLAN

SECOND FLOOR PLAN

GENERAL VIEW OF EXTERIOR

DETROIT NEWS STORAGE WAREHOUSE, DETROIT, MICH.

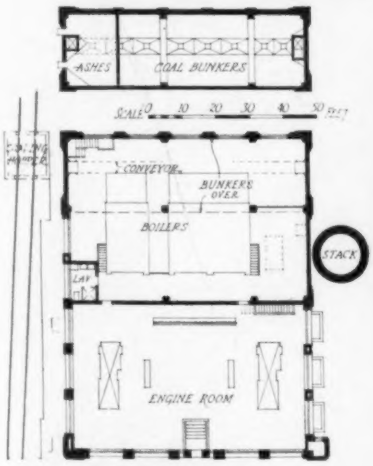
ALBERT KAHN, ARCHITECT

DETAIL OF CORNER PYLON

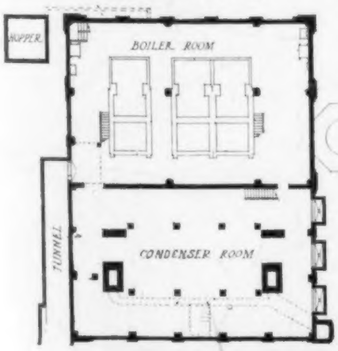
DETROIT NEWS STORAGE WAREHOUSE, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

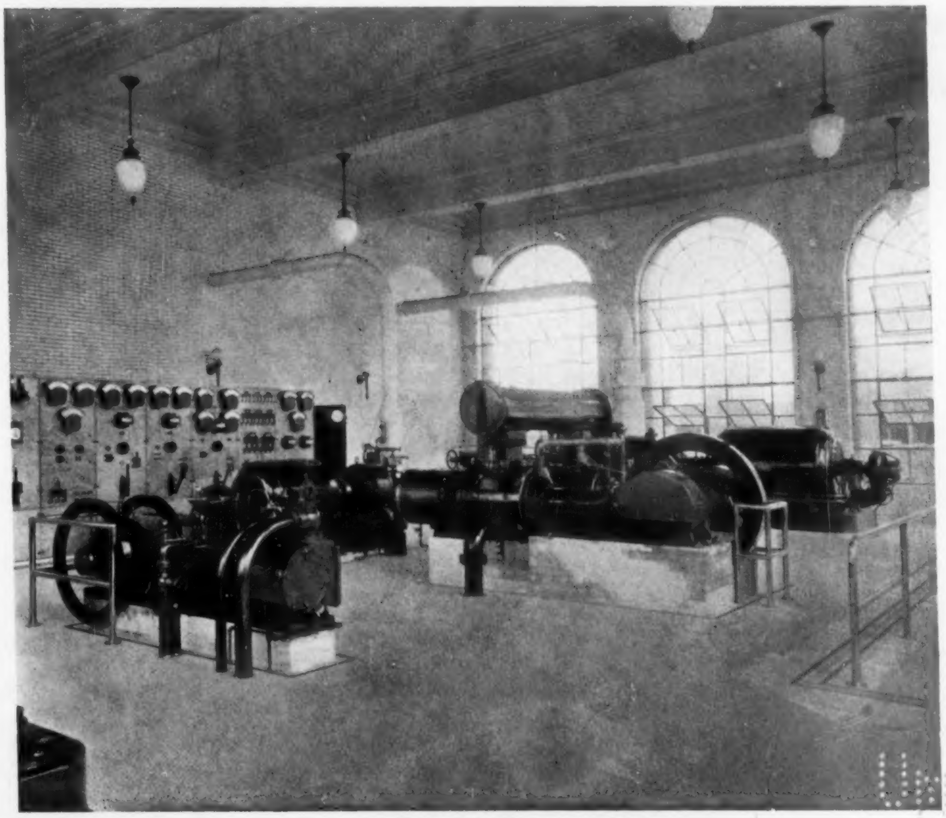
GENERAL VIEW OF EXTERIOR



FIRST FLOOR PLAN



BASEMENT FLOOR PLAN

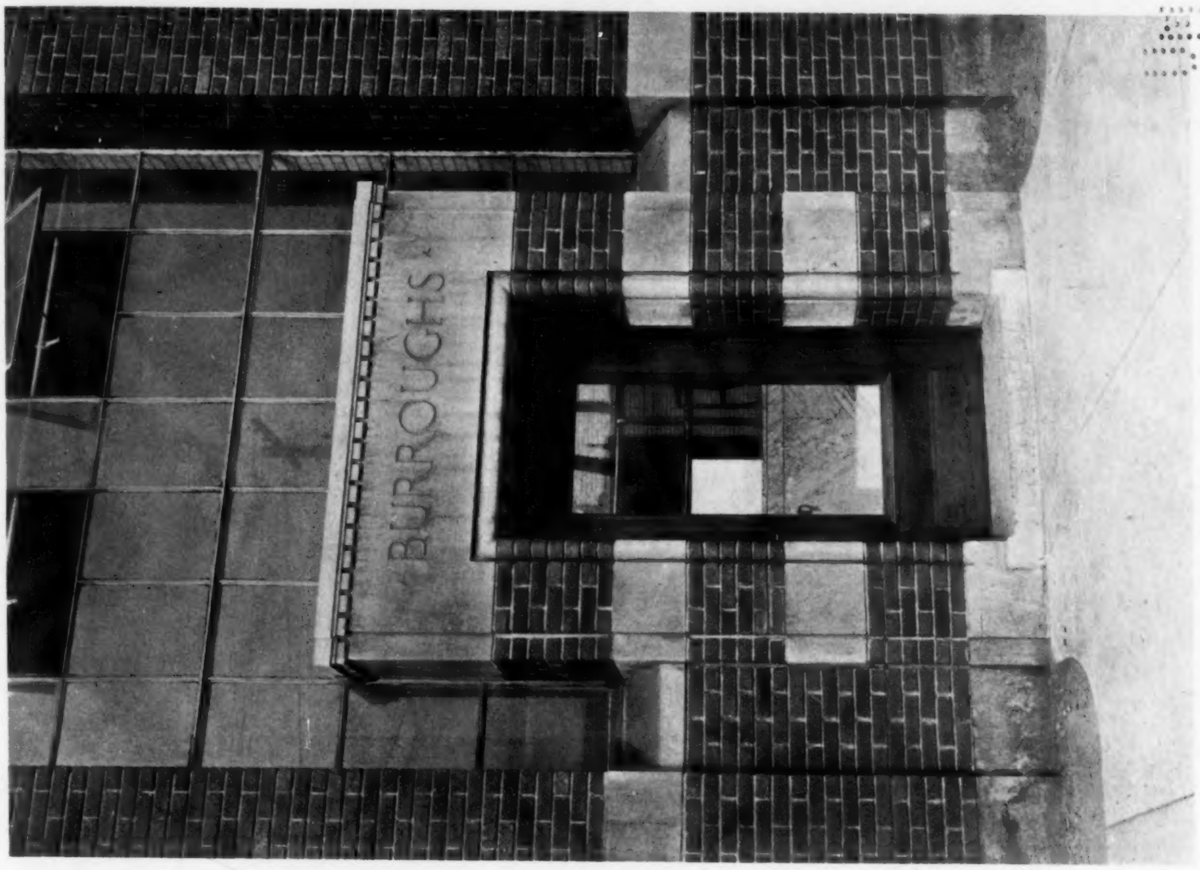


INTERIOR OF ENGINE ROOM

POWER PLANT, BURROUGHS ADDING MACHINE COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

CORNER PYLON
HUDSON MOTOR COMPANY PLANT, DETROIT, MICH.
ALBERT KAHN, ARCHITECT

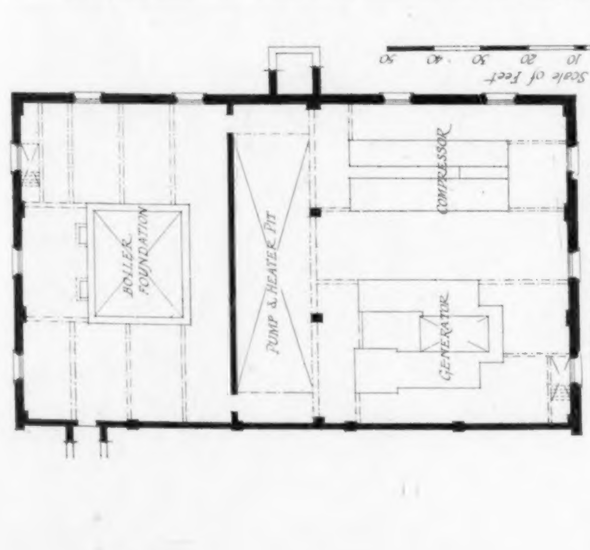


ENTRANCE DOORWAY
POWER PLANT, BURROUGHS ADDING MACHINE COMPANY
ALBERT KAHN, ARCHITECT

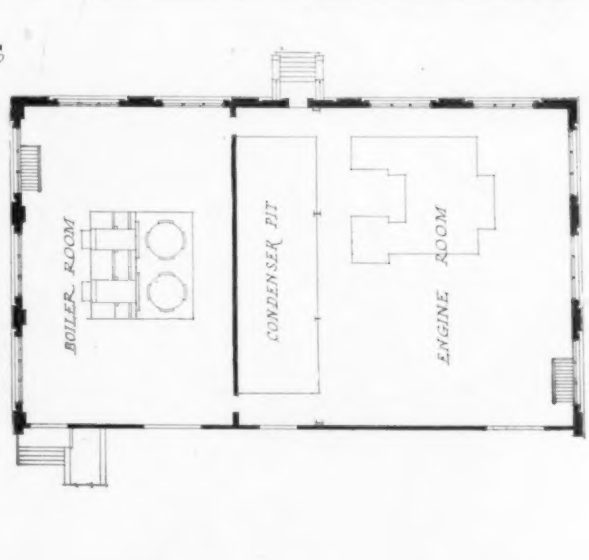
GENERAL VIEW OF EXTERIOR

POWER PLANT, LOZIER MOTOR COMPANY, DETROIT, MICH.

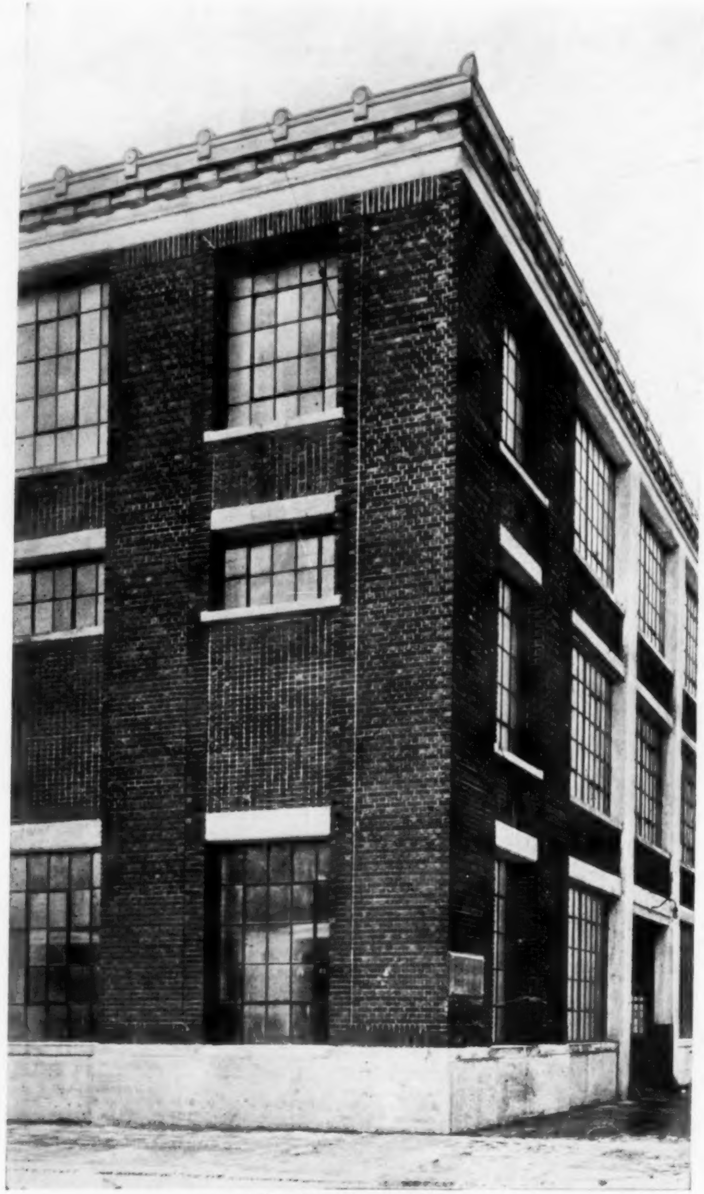
ALBERT KAHN, ARCHITECT



BASEMENT FLOOR PLAN

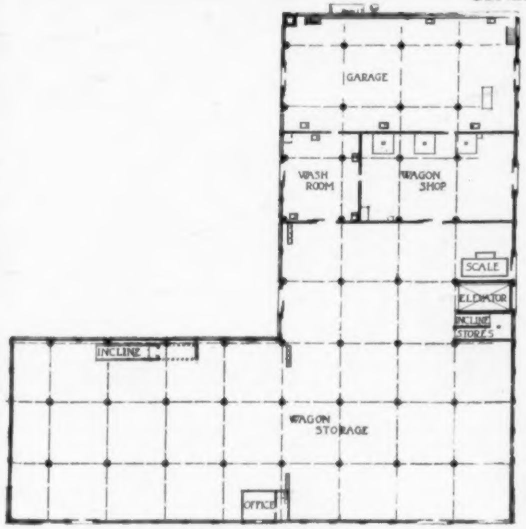


FIRST FLOOR PLAN

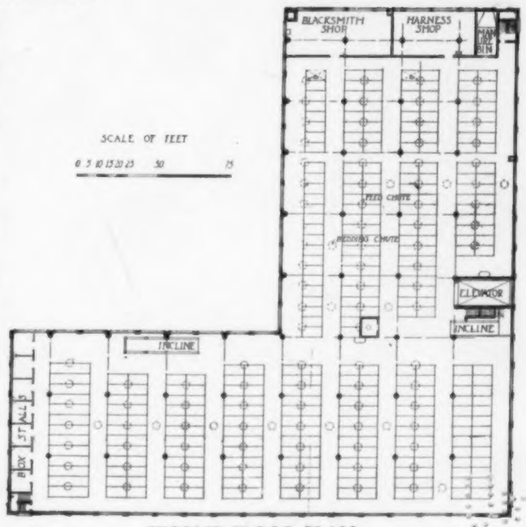


DETAIL OF FACADE

GENERAL VIEW



FIRST FLOOR PLAN

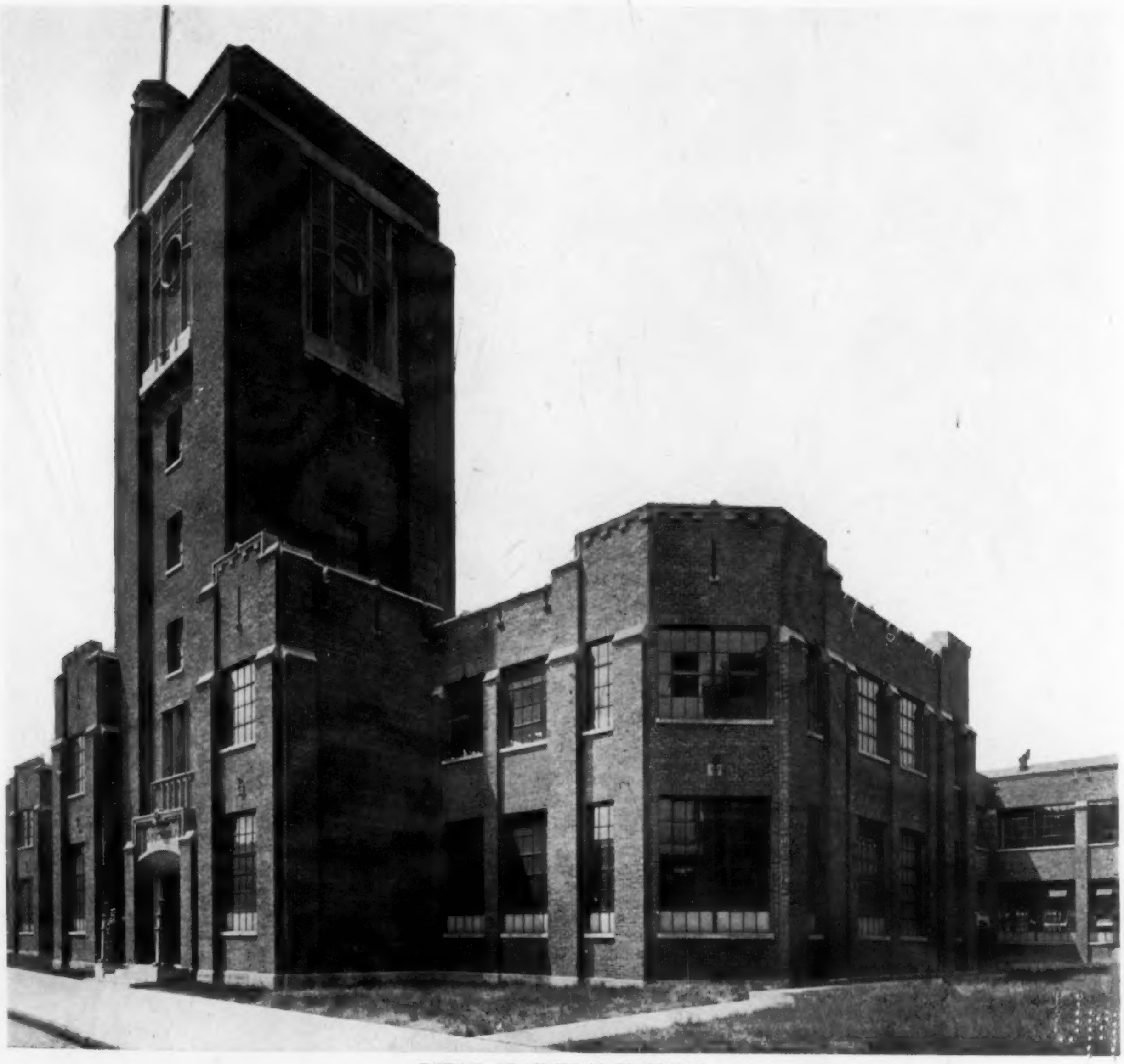


SECOND FLOOR PLAN

STABLES FOR DETROIT CREAMERY COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

VIEW OF SIDE



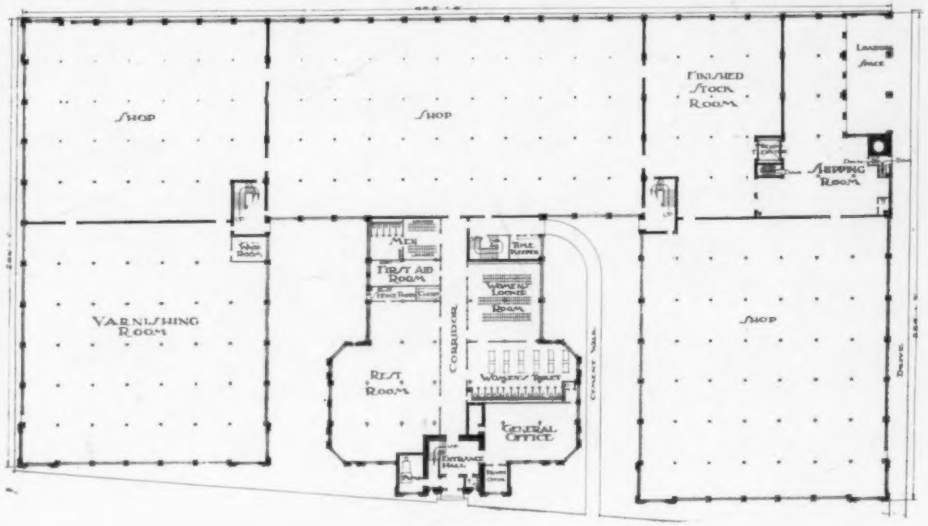
DETAIL OF CENTRAL BUILDING

MANUFACTURING BUILDING OF A. B. DICK COMPANY, CHICAGO, ILL.

S. N. CROWEN, ARCHITECT

DETAIL OF ENTRANCE

GENERAL VIEW OF FRONT

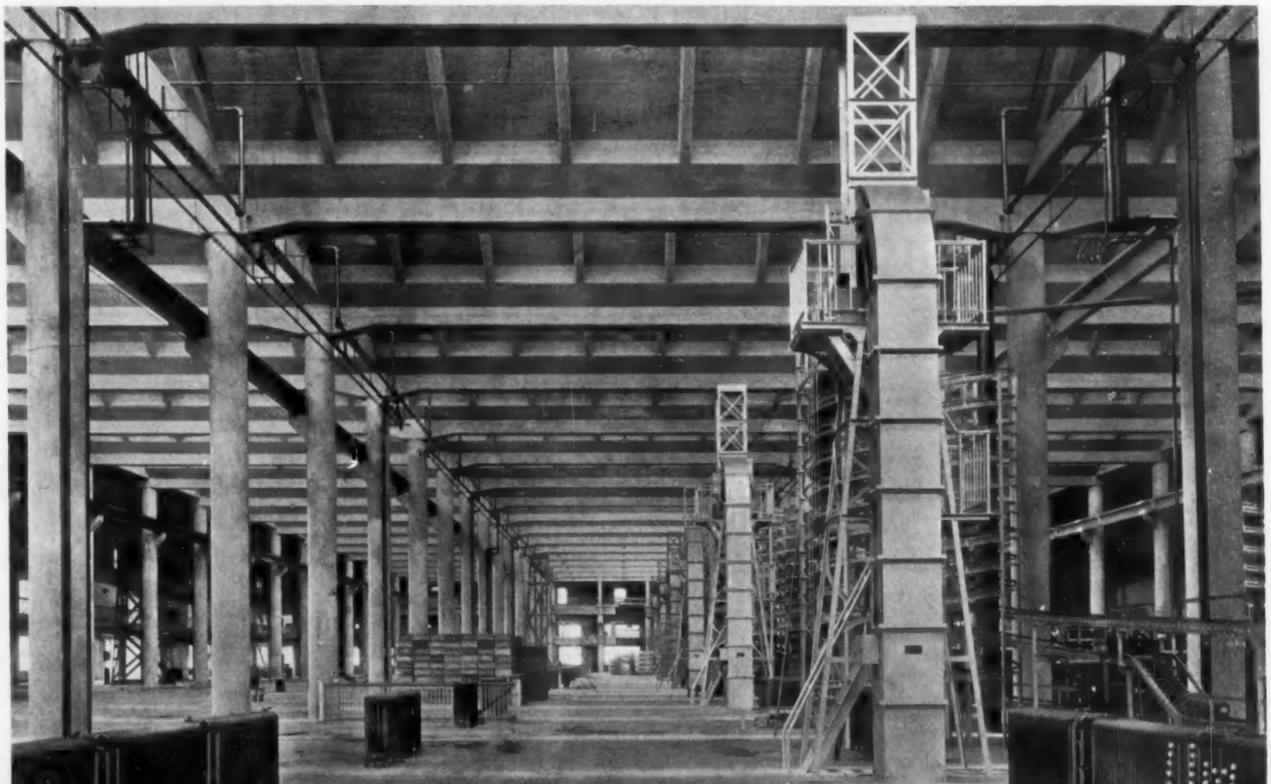


FIRST FLOOR PLAN

MANUFACTURING BUILDING OF A. B. DICK COMPANY, CHICAGO, ILL.

S. N. CROWEN, ARCHITECT

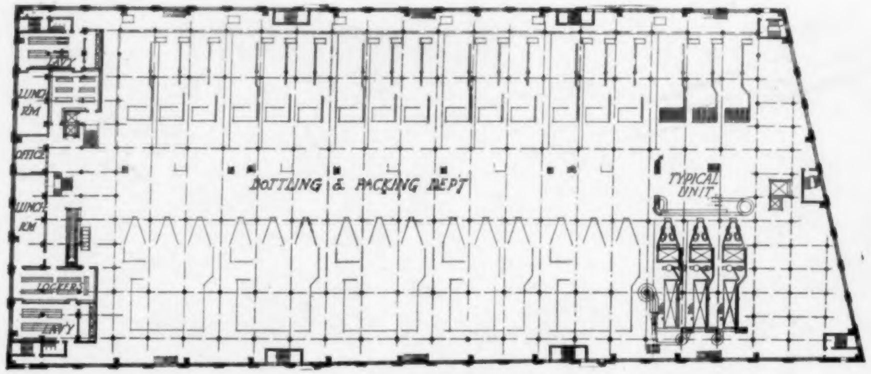
GENERAL VIEW OF SIDE FACING TRACKS



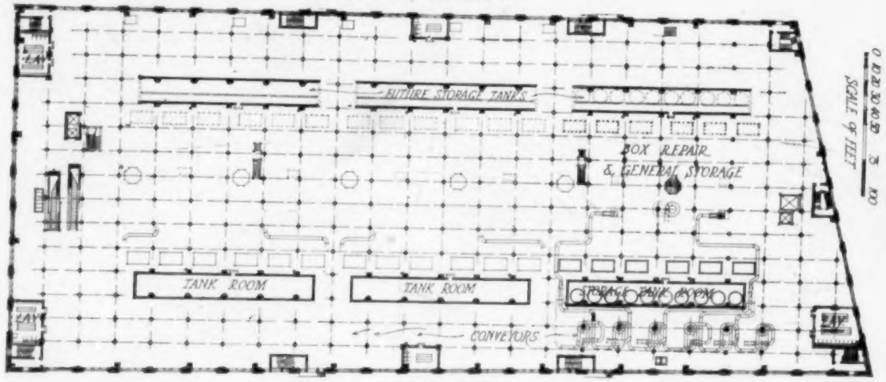
INTERIOR VIEW OF SIXTH FLOOR

BEVO BOTTLING PLANT, ANHEUSER BUSCH BREWING ASSOCIATION, ST. LOUIS, MO.

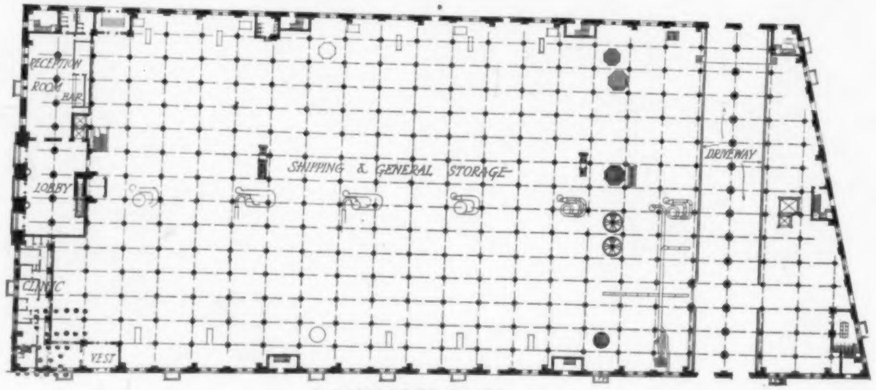
WIDMAN & WALSH AND KLIPSTEIN & RATHMANN, ASSOCIATED ARCHITECTS
F. C. TAXIS AND W. K. KNIGHT & CO., ASSOCIATED CONSULTING ENGINEERS



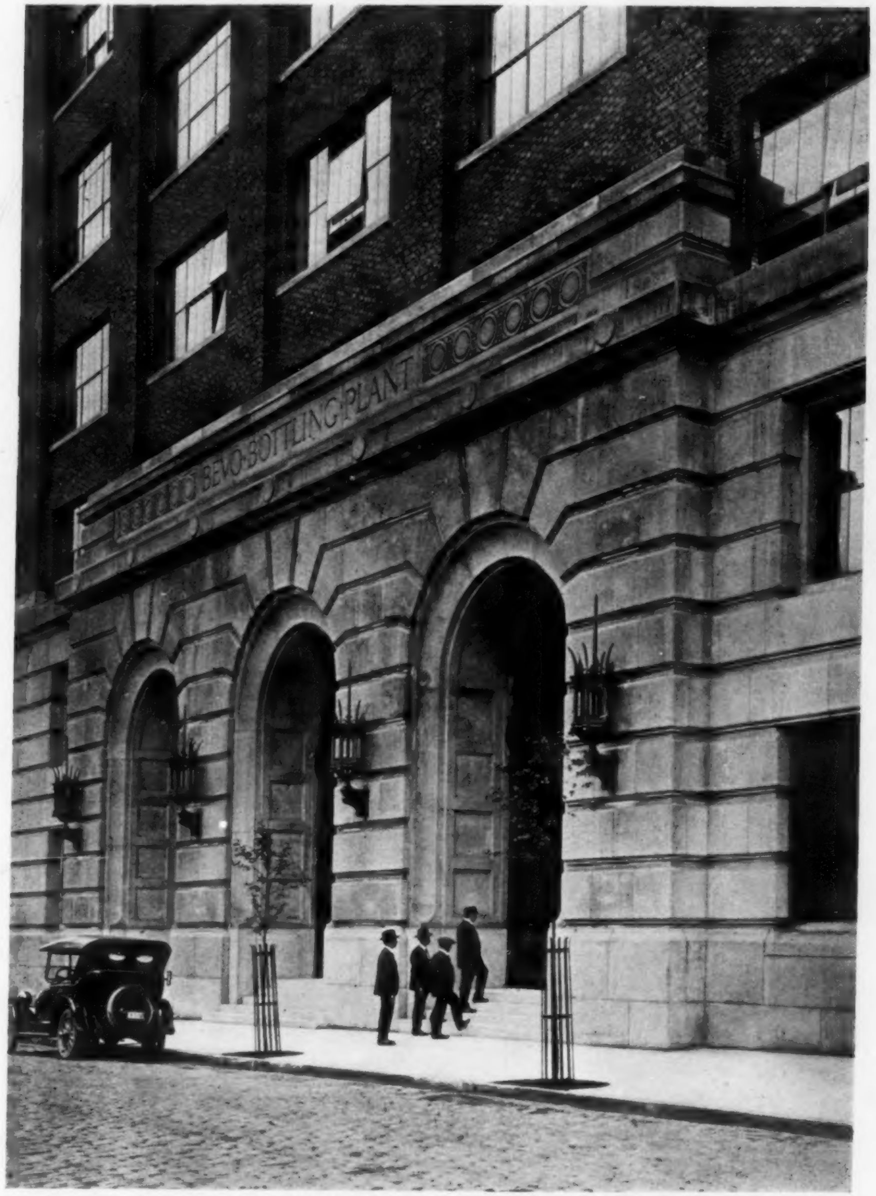
SIXTH FLOOR PLAN



FIFTH FLOOR PLAN



FIRST FLOOR PLAN

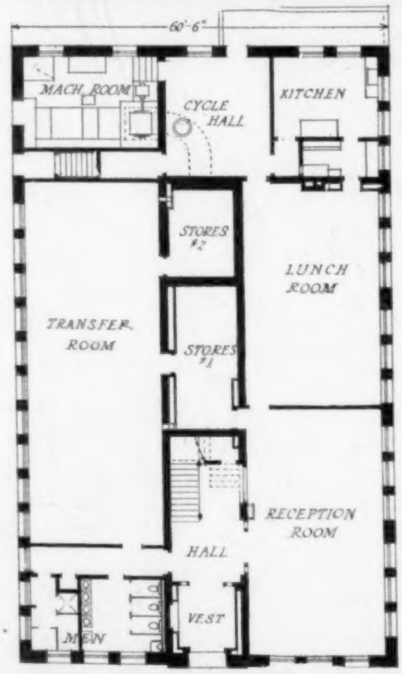


DETAIL OF MAIN ENTRANCE

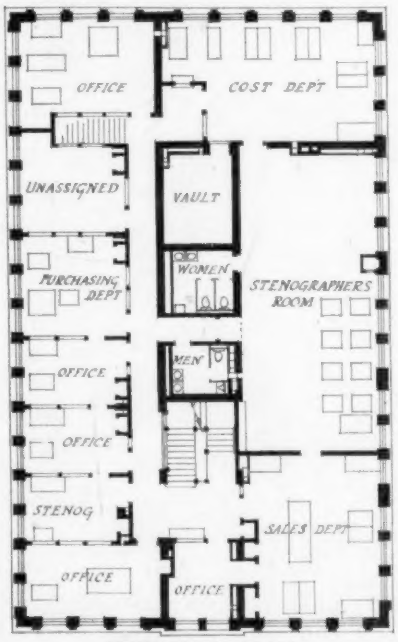
BEVO BOTTLING PLANT, ANHEUSER BUSCH BREWING ASSOCIATION, ST. LOUIS, MO.

WIDMAN & WALSH AND KLIPSTEIN & RATHMANN, ASSOCIATED ARCHITECTS
F. C. TAXIS AND W. K. KNIGHT & CO., ASSOCIATED CONSULTING ENGINEERS

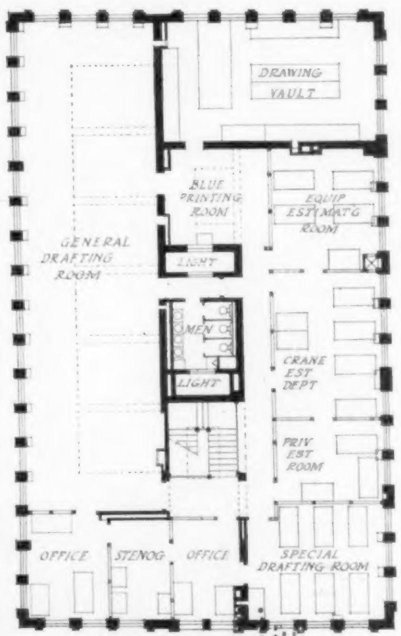
GENERAL VIEW OF EXTERIOR



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

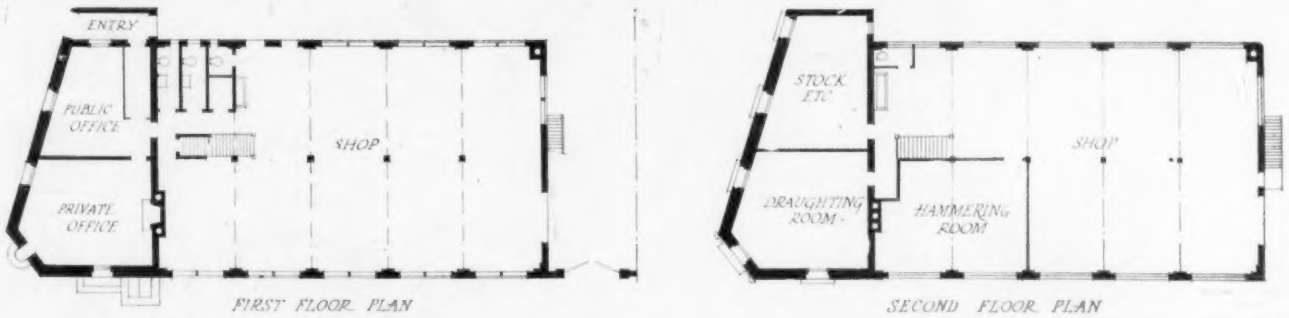


SECOND FLOOR PLAN

OFFICE BUILDING, WHITING FOUNDRY EQUIPMENT COMPANY, HARVEY, ILL.

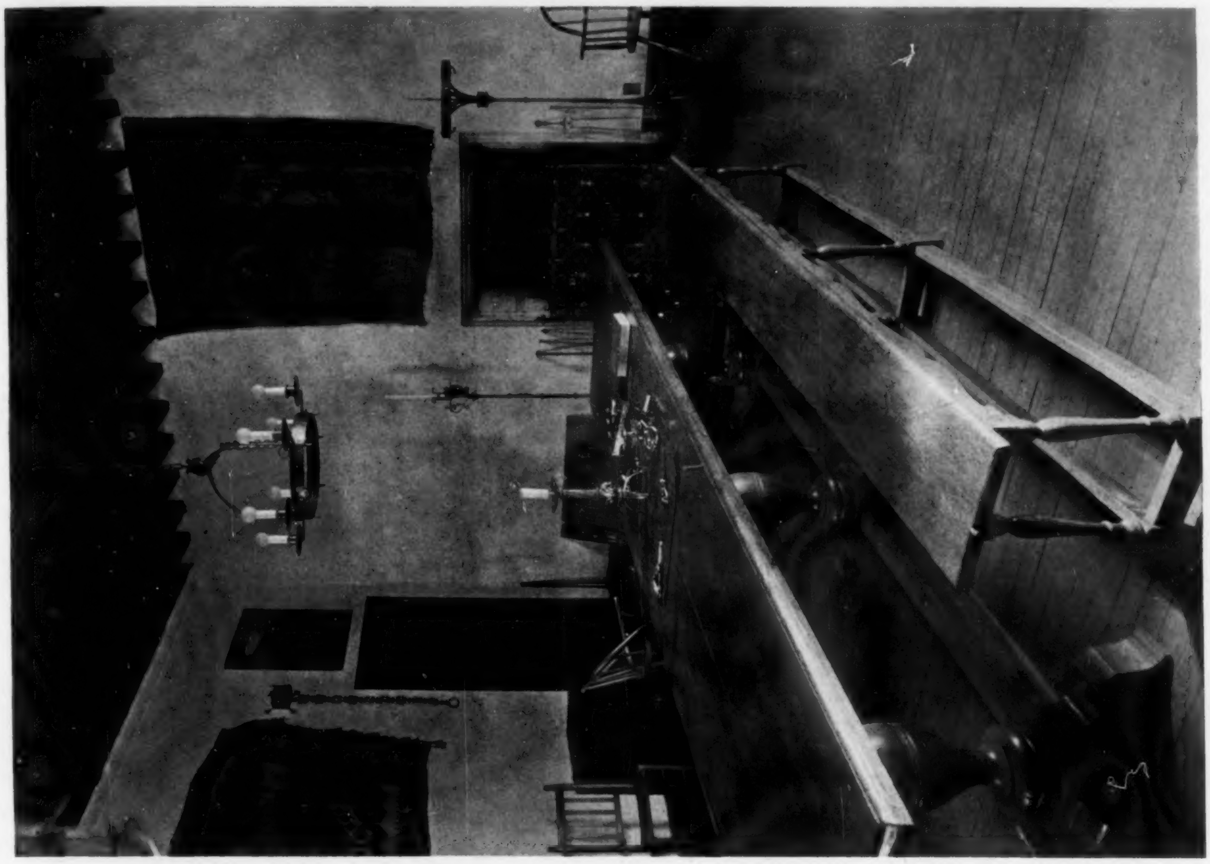
CHATTEN & HAMMOND, ARCHITECTS

VIEW OF OFFICE PORTION



ORNAMENTAL IRON WORKSHOP OF SAMUEL YELLIN, ESQ., PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS



WROUGHT IRON ENTRANCE GRILLE

VIEW OF PRIVATE OFFICE

ORNAMENTAL IRON WORKSHOP OF SAMUEL YELLIN, ESQ., PHILADELPHIA, PA.

MELLOR, MEIGS & HOWE, ARCHITECTS

Description of Industrial Buildings Illustrated in the Plates

HEATING AND POWER PLANT, YALE UNIVERSITY, NEW HAVEN, CONN. Plates 1–3. Increasing demands had rendered inadequate the central heating and lighting plant located between High, York, Elm and Library streets, and on that site being determined upon for the new Dormitory Group a new power plant became an imperative need of the University. Through the generosity of the Harkness family the University was enabled to erect and equip a plant at York, Ashmun and Grove streets.

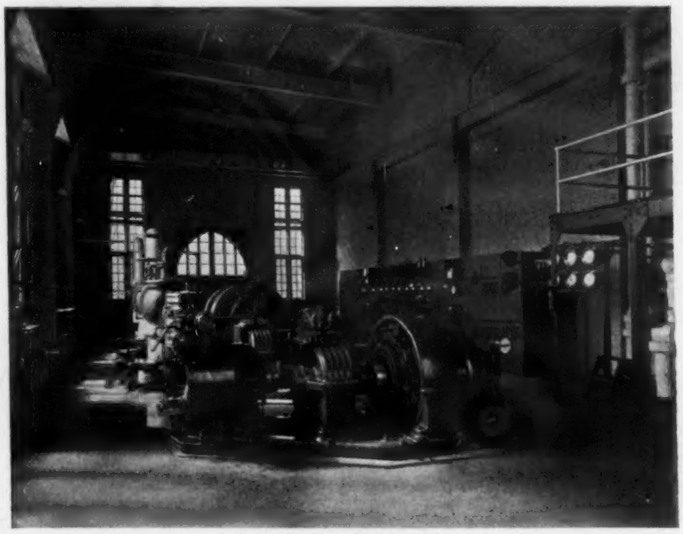
When the requirements were laid before the architects, they were quick to grasp the opportunity presented to produce a design which would have true architectural merit, and yet meet in all ways the practical requirements of the engineers. Without doubt, as erected, the building as a power plant is perfect; and yet the architectural qualities are such that, from all points of view, it is remarkable for its distinction from the ordinary structure of this type, and to the architect and layman alike, in scale, design and texture, it is satisfactory and pleasing in the extreme.

The greatest care was exercised in the selection of the brick to be used as well as the bond and thickness of joints. Numerous samples of wall were built showing various types before the final approval of the masonry was given by the architects. The adoption of Gothic for the style of the building has been fully justified by the result. The design is restrained, yet has many various and interesting motives, notably the great arches at the ends, the walls of which serve as screens to the mechanical appliances located behind them. The great scale of the interior and the disposition of the openings, of which few were required, were distinctly helpful to the architects in their successful study of the problem.

The chimney stack is unique; its great height, the unusual qualities of design introduced, the interesting variations of plan at different levels, attract and hold the attention of the observer. The departure from and the improvement over the hitherto generally accepted type of design for a power house stack is evident from all points of view.

The building replaces not only the old University heating plant, but also a smaller heating and power plant formerly located in the basement of the University dining hall, and so supplies electric light and power for a large part of the University and College buildings, including power for the University shops. The new plant also supplies heat to all the College buildings, comprising about thirty-five large structures, located in an area equivalent to eight blocks.

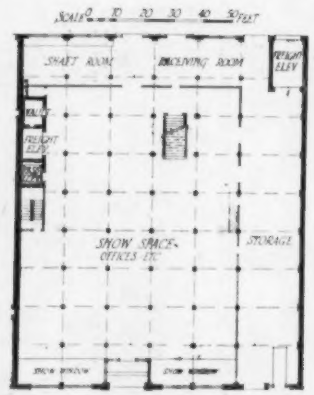
The main body of the building, about 88 feet square and 53 feet high, houses the boiler room and is adjoined on the south by a lower wing comprising the engine room. The roofs are flat behind the parapet walls with occasional crenelations. In the center of the west and east façades the parapet rises to form a frontispiece concealing the roof monitor. On the eastern side two stacks were designed besides the coal hopper and ash bunkers. Each chimney is to serve five boilers, but as only this number of boilers is at present installed, one chimney has now been completed, the other left for the future. They are of 8 feet inside diameter and are 150 feet above the boiler room floor.



Engine Room in Power and Heating Plant, Yale University
New Haven, Conn.

The structure is entirely fireproof. A self-contained skeleton of steel not only carries the roof, but provides the support for coal hoppers and other apparatus, walkways, landings, stairs and the like. The boiler room is 86 feet 2 inches by 82 feet 7 inches, and the columns are the only interruptions to this space. The exterior walls are constructed of brick produced eight miles north of New Haven and laid with wide concave joints in dark colored mortar. The trimmings of the walls are of Indiana limestone. Brick walls along the frontage of the property not occupied by the building enclose service yards. In one of these coal is received by auto truck, where it is weighed, dumped into a hopper, crushed and elevated by bucket conveyer to overhead concrete bunkers of 500-ton capacity, whence it gravitates through chutes to the stokers. Ashes are collected from

THIS building provides sales and storage space for the business of a machinery and machinists' supplies house. The first and mezzanine floors contain the executive, selling and accounting departments, and all floors above are used for carrying stock. The construction is steel frame enclosed in brick walls, the floors are of reinforced concrete in part, but generally of the laminated joist type. Window sash is steel and the trim of Indiana limestone. The building was completed in 1915 and cost approximately 20 cents per cubic foot.



FIRST FLOOR PLAN

THE CHARLES A. STRELINGER COMPANY WAREHOUSE, DETROIT, MICH.
DONALDSON & MEIER, ARCHITECTS

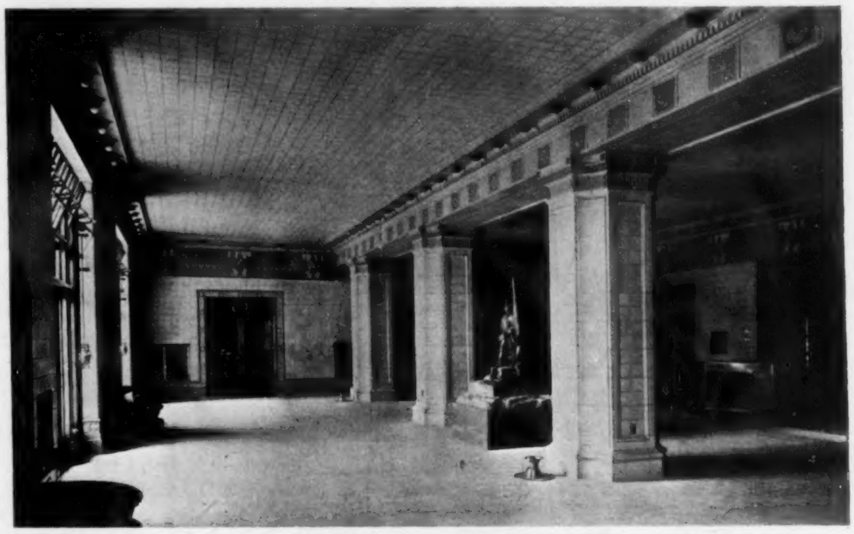
the boilers into cars which deliver their contents into a chute, whence the ashes make their way by bucket conveyer to an elevated ash bunker and from that are hauled away by truck.

Five 500 H.P. boilers are now installed and are equipped with automatic stokers, soot blowers and conveyers, steam flow meters and balanced draft apparatus. Forced draft is obtained by means of 7½-foot and 5½-foot fans and concrete ducts for air distribution under the basement floor of the boiler room.

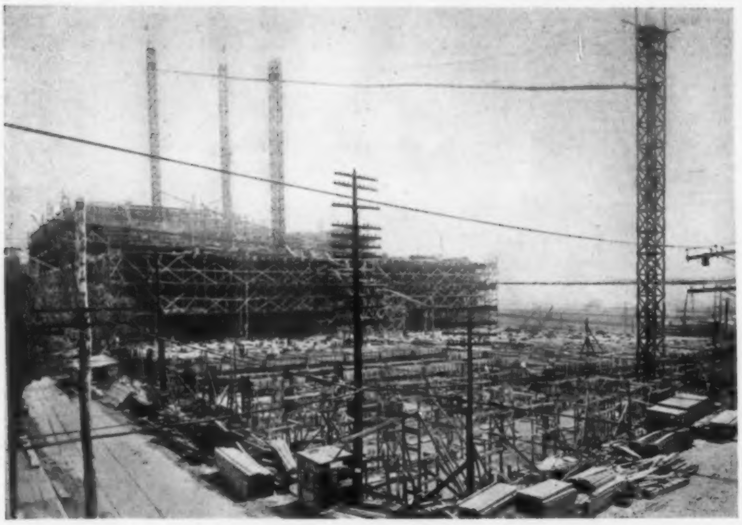
In the engine rooms are two new 300 K.W. turbine units and two old engine units of 75 and 150 K.W. capacity, the latter formerly in use at the old dining hall plant. There is space also for a third turbine unit; a 5,000 H.P. heater meter, two feed pumps and other apparatus are accommodated in the engine room, and over all there is a 10-ton traveling crane. In the basement of the engine room are two large steel tanks which receive the return water from the various buildings and whence it is pumped to the feed water heater. The apparatus was selected and the plant designed with a view to its being used for the instruction of students of the Sheffield Scientific School.

Manufacturing Building for A. B. Dick & Co., Chicago, Ill. Plates 10, 11. This building was constructed in 1918 as a war need for the manufacture of mimeographs for the Government. It is 405 feet long and 225 feet deep, having a total floor area of 162,000 square feet. The average height is 35 feet 5 inches and the cubical contents is 3,217,865 cubic feet. The building is of standard Underwriters mill construction, with factory type steel sash glazed with plate glass. The first floor is of concrete placed on the ground, and the finished surface of the second, maple, the floor load being 150 pounds per square foot. The building contains a complete mechanical equipment, including an automatic sprinkler system, the tank for which is concealed in the tower. The unique feature of the structure is that the first floor is devoted to storage and heavy manufacturing purposes, and the second floor to light manufacturing. This floor has been given special attention so as to provide 100 per cent daylight, evenly diffused. To accomplish this, sawtooth roofs have been used, the sash being placed in a vertical plane and the backs of the skylights covered with white roofing to assist in the diffusing of light. Throughout the second floor there is an even distribution of light without shadows. The cost of the building was $464,-660.40 — $2.99 per square foot or 16 cents per cubic foot.

Bevo Bottling Plant, St. Louis, Mo. Plates 12, 13. This huge warehouse and bottling plant has a total floor area of over a million square feet, each floor having an area of 144,872 square feet. The height of the building from the track level to the top of cornice is 146 feet 7 inches, the tracks being approximately 30 feet below grade.


Public Entrance Lobby


Freight Handling Facilities on East Side, Bevo Bottling Plant, St. Louis. Mo.

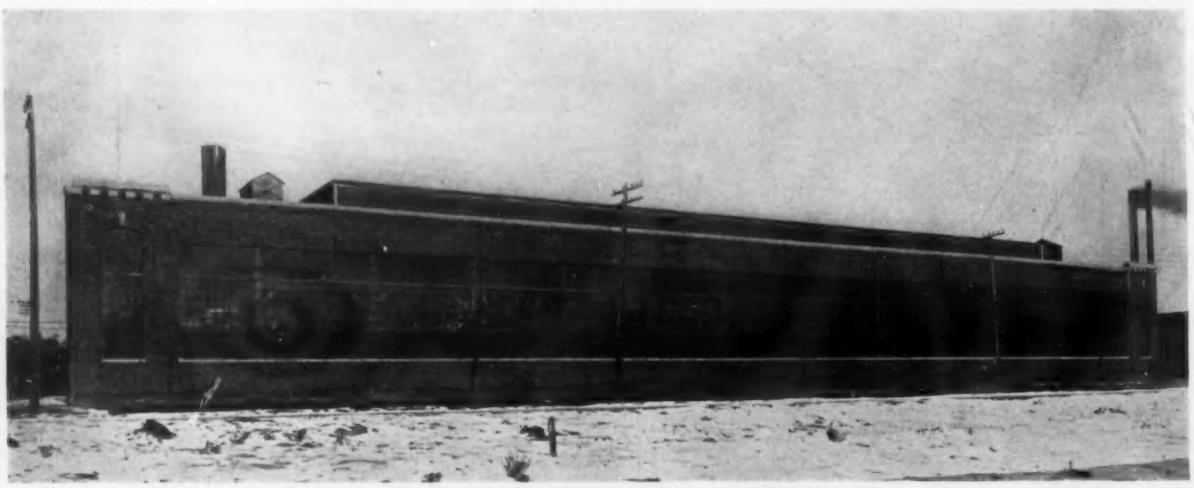


Extensive Form Work Used in Construction of Bevo Bottling Plant

The construction is of reinforced concrete, the columns having spiral reinforcing. The live floor load throughout the building is 275 pounds to the square foot. The typical column spacing is 16 feet 6 inches by 25 feet. Two expansion joints occur in the building and each is arranged in the center of a span, the floor at either side being supported by cantilevers.

The bottling and packing are done on the top floor. This floor has a height of 37 feet 6 inches, and the columns supporting the roof are spaced 25 by 49 feet 6 inches through the central portion to accommodate the large mechanical equipment. Two mezzanine floors at each end of the building provide space for toilets, lockers, lunch rooms, etc. Daylight is provided by means of sawtooth roof skylights. The fifth floor contains a series of storage tanks enclosed in partitions, and the center of the floor space is used for repairing boxes and general storage. The remainder of the floors below the fifth and including the second are for general storage. There are nine enclosed stairways located along the outer walls with entrances from the various floors through two doors. The interior walls of all floors are lined with enameled brick. A complete conveyer system is installed for handling the product from the top floor to the shipping platforms in the basement. A sprinkler system is installed throughout. The main portion of the first floor is devoted to shipping and storage. At the main entrance there is a large lobby, the walls, floor and ceiling of which are finished in colored tile. Adjoining this lobby at one end is a visitors' reception room with tile floor and wainscot, and at the other a series of rooms forming a clinic. These have finished floors of cork tile. The lower stories of the exterior are faced with Indiana limestone and the body of the building is brick with a terra cotta cornice.

Office Building of Whiting Foundry Equipment Company, Harvey, Ill. Plate 14. This building is of fireproof construction; the floors of reinforced concrete with a composition surface finish; all windows of steel sash with wire glass, and interior partitions of glass and metal. The building was planned to fit the special needs of the company; the entrance is in the basement, on which floor is a reception room made attractive with leather couches and easy chairs and where photographs of executed work are exhibited. Because of the building's location in a manufacturing district where there is much soot and dirt, all air is washed before being supplied to the various rooms, and this has added materially to the health and comfort of the office force. The building was erected in 1916 and cost 21.8 cents per cubic foot.



Kelsey Wheel Company, Detroit, Mich.
Albert Kahn, Architect

The Post-War Committee on Architectural Practice

SOME COMMENTS FROM ARCHITECTS RELATING TO QUESTIONS ASKED BY THE COMMITTEE

THE Post-War Committee on Architectural Practice appointed by the American Institute of Architects to inquire into conditions surrounding the practice of the profession has had a ready response from architects throughout the country, and many suggestions have been submitted to it. Since it began its labors, conditions in the architectural world have become more nearly normal, and many of the causes which lead up to its appointment are not now so apparently prominent; but this should not cause any lessening of effort on the part of architects in co-operating with the committee. There still remains the need of studying the profession and its activities, so that new lines of endeavor may be pointed out that will aid the architect in playing his proper rôle in the period of great development the United States is now entering.

The future of architecture is brighter than any period of its past; there is greater evidence of a desire on the part of a larger number of people for buildings of good architectural character than ever before; the standard of living among working people is constantly rising, and with means of education available to all, increasingly better homes will be demanded. With this period of prosperity for architects there goes, however, a greater sense of responsibility. The architect has been the factor of greatest importance in raising the standard of our public buildings and in creating a finer regard for architecture among people of culture. His influence must now, however, be extended to wider fields; he must provide a service greater than designing buildings; he must be aware of sociological questions influencing our civilization; he must recognize the economic conditions of the present and devote his energy toward securing the most efficient use of labor and material that the cost of construction may be kept at a moderate figure. His work should not be regarded in the light of an added item of cost; it must be made so valuable that it will be indispensable in every building project. This can be done and must be done to safeguard his own interest; the tendency of the day is toward the creation of larger units that promise greater efficiency, and the field of building is not without interests that attempt on this score to appropriate the architect's rightful function. Constant and intensive study of to-day's problems, lively co-operation with all agencies working for the improvement of the building industry, must be carried on in order to maintain and protect the high standards of architecture that have been built up.

We are privileged to present herewith some interesting letters on subjects contained in the Post-War Circular; others will follow in the nest issue, and we will be pleased to print brief comments submitted by architects on any of the topics being considered by the committee. — THE EDITORS.

Editors, The Architectural Forum: Of all the subjects referred to in the Post War Circular, I suppose none will appeal more strongly to the profession than the vital topic of its relations with the contractor. His is the essential function which finally produces the building, and without his earnest and willing co-operation the best of plans can only produce a failure. Under the old régime, which now shows signs of passing, a sort of lord and vassal relation existed, accepted complacently by the architect and tacitly, though sometimes rebelliously, by the builder. The latter was expected to defer to the architect's convenience at all times, accepting thankfully such details of information about the work as fell from the drafting table, and to wait, hat in hand, no matter how long, for the architect to see him after every one else had received attention. He was expected to supply what additional strength was needed after the conventional "6 x 8" suddenly turned out to be insufficient, to remember to include in his estimate all the missing links of the specification and in general to "put it up stout and strong" and make it good if he failed to do so.

In the good old days when the builder kept a half barrel of English Portland cement in his barn and doled it out in teaspoonsful where extraordinary strength was required, when the calculation of "sand piles" and "flitch plate girders" formed engrossing chapters in the hand books and fireproofing, even firestopping, was unknown, this system for some incomprehensible reason seemed to operate; but with the advent of highly developed and patented building materials the builder suddenly transformed himself into a well equipped business man, often with an engineering training received at a first-class school, and not infrequently with a college education besides. After this process the old business of vassalage no longer seemed to fit, and while the architectural schools were still turning out graduates trained perhaps in the design of Roman entrances and state

drawing rooms, but innocent as an unborn babe of how to choose the psychological moment to substitute a flat slab for a beam and girder construction, the engineer-contractor calmly "eliminated the middleman," in this case the architect, and did the whole job himself.

I hold that both of the above situations were and are wrong. The building trades, to produce a result which will be the best in every sense, need the planner, the architect, and he should be a man endowed with imagination, ingenuity, vision and a quiet mind, free from *ambition* to form a great office "organization," though success may force him to do so. He should not attempt to take on the contractor's function of the actual operations of construction, and conversely the contractor will best fulfil his mission if he confines himself to producing buildings of honest quality and prompt execution.

If all the architects, as many actually do, will honestly endeavor to master the business and technical details of their job, trying to produce as good plans and specifications as they possibly can, and if the builders will co-operate by trying to meet the honest specification with equally honest construction, eliminating the "just as good" business, future occasions for such discussions as this will never appear, and I firmly believe that more frequent meetings, outside of business hours, of well intentioned architects and builders, will do much to bring about such a consummation.

Much of the above applies equally to the engineers. More frequent interchange of ideas between modern minded architects and progressive engineers must result in the greatest benefit to both. Less introspection, more thought on the work in hand and perhaps for the present less time spent on abstract "uplift" will soon put the profession in a healthier condition than ever.

WALTER H. KILHAM.

Boston, June 2, 1919.

Editors, The Architectural Forum: You have asked me for an expression of opinion as to how the public may be reached "architecturally"—that is, I take it, as to how the public can be educated up to a proper appreciation of the functions of the real architect, and thus to a proper regard for the profession as such and for the individual practitioner as representing a valuable profession.

I am setting it down as indisputable that the architect's functions are valuable to the public, and am taking it for granted that they are performed primarily for that reason, and only secondarily for the personal pleasure which is incidental to the performance of worthy architectural service, or to worthy accomplishment in any of the arts. The public must be made to realize the high function of the architect and must be taught that the wide difference between building and architecture lies in the fact that mere building is intended primarily to serve physical needs, while architecture ministers primarily to the needs of the spirit, serving at the same time, and equally with building, the needs of the body. Does the profession of architecture realize fully that it is a preaching and teaching profession as well as a building profession, capable of preaching and teaching through the medium of its building endeavors? When the profession comes fully to appreciate its priestly function and sincerely to exercise it, the public will readily enough recognize its validity, and the great step in the education of the public through the intervention of the architect will have been taken. But the architect must be the first to recognize his own high office.

Before the architect intervenes, however, the first step is to be taken by the educators and moralists. In the primary grades the process must be begun, continuing from rostrum, platform and pulpit. The value of beauty as ministering to the spiritual side of life must be emphasized in the mind of the child and the man. "Worship the Lord in the beauty of holiness." Worship and holiness are not sufficient in and of themselves; the act and the impulse must shine forth in beauty. Children, youths, adults, in all stages and in all strata of society, must be given a new conception of beauty, a new conception of art; must be taught that beauty for itself is worth striving for, and that art is the means of its accomplishment. Art must be taught as action in every field of human endeavor—action directed by spiritual impulse toward perfection of accomplishment. Beauty must be taught as residing intrinsically in the act performed or in the object produced, and not in the superficial application of unrelated or extraneous forms. Art must be taught as a necessary factor of everyday, commonplace existence; not to be considered as for the elect, to be acquired for the elect alone, but to be insisted upon as an office to be performed and a right to be exercised by every member of society, from the highest, if such distinction can exist as to art, to the most lowly. Lessons in school, games on the playground, social contact in the home—all must be considered as fields in which art is to be assiduously practised and in which the spirit of beauty is to be constantly evoked; in which is to be developed that love for doing the appropriate thing beautifully which later shall lead to an appreciation of architecture and to a comprehension and understanding of the subtle message embodied within its forms.

But the architect need not leave the entire burden of educating the public to the educator and the preacher. He may educate and educate through these as well as directly. He, however, needs must hold ideals and know his own mind. If the architect himself is not well equipped and well balanced as to ideals and definiteness of aim, let him not complain that a disinterested public evinces no appreciation of himself or his product; if there is not some community of aim and idealism in the profession, let it see first to the beam in its own eye.

The architect worthy of the name knows and will teach that beauty costs and is well worth paying for. Ugliness is cheap in material measure, but fearfully

expensive measured spiritually. The idea should be enforced that church and school buildings which are not to be considered as factors ministering to the physical comfort of a community perform a spiritual office; and, as they are necessary as ministering to the spiritual, that ministration should admit of no curtailment and these structures should be made as beautiful as possible and at any necessary expense. (I say as beautiful as possible, not as elaborate.) The architect may well teach his committees that there is no excuse for ugliness in buildings serving altruistic purposes; indeed, that ugliness defeats their purpose.

And if this applies to purely altruistic buildings, how deeply should it apply to the factory, to the office building, and the workers' home — types of buildings which touch the common life on the practical, every-day side and should tend to elevate it. Here is a fertile field for architectural enlightenment by architects, educators, preachers; in the office, on the platform, in the pulpit; but the architect may well direct. If the architect does not or cannot direct, or at least show the way, he has no vital message to impart, and need not be concerned with the public's opinion of his work. But the matter of beauty and its ministration to the spirit is vital and of general import and in time will be a factor in public education and in the common life.

IRVING K. POND.

Chicago, May 14, 1919.

Editors, The Architectural Forum: One of the inquiries raised by the Post War Committee at the Nashville Convention of the American Institute of Architects was, "In what manner can the service of the architect be extended?"

One does not have to look far afield to discover one opportunity for increasing the architect's service, which is well worth while from every standpoint, and that is for architects generally to undertake to do all kinds of industrial buildings.

In spite of the fact that this period in which we live is preeminently an industrial one, comparatively few architects have undertaken to solve the practical building problems involved in factories, warehouses and the various utilitarian buildings of commerce.

Because of this fact the impression is maintained by the public generally that architects are not qualified to solve these practical problems. There is probably no more unfortunate situation to-day so far as the architect is concerned, because it cuts him off from doing his share of what is regarded as the most important work of our times.

This is particularly regrettable because the architect, by virtue of his training and experience, is best qualified to do this kind of work. Moreover, this same utilitarian work is now more than ever offering increasing opportunities for artistic and beautiful design, and thereby opening up that particular side of the practice of architecture which is the most interesting to the majority of architects.

It has already been demonstrated by numerous instances that an industrial plant can be architecturally designed so as to make it attractive and often beautiful by a comparatively slight increase of expense over the cost of the unsightly, utilitarian structure usually produced. In fact, it has been found that the most ornate examples of factories, warehouses, etc., whose cost has been analyzed, have in no case exceeded the cost of the ugly utilitarian type of buildings by more than 5 per cent of the cost of such buildings.

As a general rule, it will be found that in most cases factory problems have some excess land not covered by the building, which gives the opportunity for breaking up the façade of the building and also the opportunity for a green foreground, which may be planted and often landscaped, thereby giving the building a beautiful setting of flowers, lawns, trees and shrubbery. There is also usually the sprinkler tank to be installed, which makes a proper occasion for a beautiful tower to dominate the whole composition. The usual requirement for dividing up the building into its different departments and expressing these in the exterior, and the various forms of construction that may be applied to meet the different processes of manufacture, give rise to very interesting features of the exterior. These are only a few of the opportunities offered for the proper and useful application of the artistic capabilities of the architect. But perhaps the most useful part which an architect can play in the solution of these problems is the employment of his particular faculties and experience in determining for the manufacturer the best plan and arrangement for his building. By reason of the architect's special training, which develops his imagination for the purpose of creating architectural design, he is particularly fitted to plan and work out the difficult problems of arrangement and construction which are essential to secure the most logical and economic method of production. The designer who possesses a highly trained imagination, such as the architect, is in a position to invent and create new arrangements in plan and new constructions in the building that may entirely revolutionize old methods of procedure in the operation of such plants. The ability needed for solving the hardest problems of the industrial building is not so much the exact knowledge of mathematics, science and engineering, as it is the inventive genius of the trained architect.

Then in addition to this are the great opportunities offered for solving the many problems involved in the care and welfare of the employees of such plants. The solution of these problems, outside of sanitary matters, depends largely upon an artistic treatment of the problems rather than upon a scientific one.

These are only some of the opportunities open to architects in the industrial field that would greatly extend the service of architects, if the members of the profession generally would undertake to perform what seems really to be their share of this important work of our times.

GEORGE C. NIMMONS.

Chicago, May 20, 1919.

Editors, The Architectural Forum: We know the worst. The inadequacy of the architect is at last revealed. He was well enough for the tolerant and somewhat dull world before the war, but he must not presume to impose himself upon the alert and superior public which has to be reckoned with henceforward. If the architect of to-morrow have anything to "put across," he may catch this amazing public by the coat-tails, for he must no longer expect to be pursued to his traditional retirements. He is now to be of the sidewalk. Nor is his interest to be flattered by the old deference for its claims to fine art or any of that sort of rubbish. Art must look to be cried in the marketplace, like other commodities.

As to architecture, that we believe is to be reduced to a more or less respectable element in the adventures of contracting or real estate. Whether, in this event, the real estate man or the contractor shall fuse himself in the architect, thus achieving a sufficiently formidable sort of person; or another shall assume to dominate the trinity, or whether all shall agree to be effaced, in the interest of an invincible engine of industry, is the only question that remains to be settled.

It is clearly ordained, in the least of these destinies, that the post-war architect will be "up to snuff." It is no less obvious that if he is to have hope of surviving in the new atmosphere with anything like his historic consequence, he must become a very monster of efficiency. How fortunate it is for those who, like myself, feeling the sun upon their backs, may smile at revolutions! But our sensibilities persist. The raucous industry of a certain professional journal in proclaiming the new dispensation has at times humbled me with such a sense of my individual incapability as almost to provoke me, out of very decency, to seek out some honester livelihood. Cowardly, however, I stilled the uneasy conscience by cutting off my subscription.

Perhaps I should bring a more serious spirit to this topic, but I am more affected by its amusements. Are we expected soberly to believe, because we have been obliged to pass a brief year or so in doleful contemplation of our bare drawing-boards, that the world has irrevocably forsaken us? In the national extremity, we were not needed, it is true; the engineer rather than the architect was pronounced for the emergency. This was discouraging, of course; it was thought even to be humiliating, and there was loud and bitter protest. But there was no real humiliation except that which came from the exhibition of chagrin and bad temper at the preference for a profession which has had its historic place in military science and tradition and was obviously more available, whatever we say, to the hour and the task.

Partly from this new direction there developed under the stress of war preparations new combinations and new constructive agencies which in the circumstances made for occasionally impressive results. And now it is feared there will be such a general demand for the extension to normal building enterprise of this highly organized efficiency as hopelessly to submerge the individuality of the architect who, it is proposed, may yet save himself if he only fling overboard the useless *impedimenta* of old fashioned convictions and ideals which are no longer reverenced. In blunt speech, he may cling to his job by the act of making a business of his profession. The moral surrender implied in this idea is, I believe, thoroughly understood by its advocates; but notice has been served that the times will no longer tolerate the old flabby ideal of professional individuality. They demand efficiency, and this despite the opportunity we have had in the last few years to regard the fortunes, and finally to witness the deep damnation of certain giant efficiencies which were too contemptuous of the spirit. It was a lesson which should be a warning to civilization for a century. Is it a principle beyond our heeding here?

A few weeks ago, as I reclined during a spell of apprehensive idleness in a dentist's chair, I sought distraction by making inquiry if all were well with that energetic interest. "Doctor," said I, "is your profession in any way troubled about itself these days? Is it, for instance, quite satisfied that it is thoroughly attuned with modern life?" He looked anxiously at me, as if he had carelessly trifled with some nerve which communicated with the regions of gray matter. "Let me put it this way: are you dentists playing up to your business opportunities?" "Ah, now I get you," he said with an air of relief. And then after a pause, "I hear this sort of thing. A friend of mine has been trying to persuade me that I am several kinds of a fool because I refer my surgical cases to the dental surgeon and my mechanical cases to the dental mechanic, virtually putting good money in other pockets which I might, by merely engaging a couple of qualified assistants for that service, easily put in my own. But I call that a pretty commercial proposition, don't you? One's personality, after all, is worth the keeping." Here is our own case in all its crudity. Thus stated, one would hope from our profession as clear a perception of the moral issues and as swift a verdict.

They are free to forsake architecture who perceive more alluring prospects. But no comfort should be extended to those who, in the name of a new day, seek official sanction for a debased professional standard. There is something base in the suggestion that we owe it to the war, and therefore to the victory, that we abandon the spiritual principles and restraints of a noble profession, and that, too, in face of the fact that there has never been a time in our history when its accomplishment had even approached the distinguished level of the present hour, or when it had contributed so notably, through its men of genius, to the varied activities of the national life.

It is no part of the materialistic program I observe to remove real professional disability. I refer to the demoralizing practice of competition, which, whatever may be said for it as a method of selecting an architect in the case of public work, has wrought incalculable harm to the profession. Is it not absolutely certain that the main, if not the whole, difficulty in

gaining public acceptance for a reasonable minimum charge for professional services was that in actual practice we were demonstrating that our minimum charge was really zero?

I neglected to ask, but I should dearly like to know, how dentistry gets along without competition? Particularly how has it continued so docile a constituency?

I venture to say that not even the architect with a toothache would dream of making a condition of his patronage that half a dozen dentists gratuitously exhibit their skill for him. Instead, he meekly submits like the rest of mankind to the imperativeness of a piece of pasteboard which calls for his prompt presence at a given day and hour in the dental antichamber.

We have not, I fear, brought up our clients the right way. And the young men? When I speak my mind to brother architects about competition, I usually encounter the idea of the young man. Where, in heaven's name, do the young doctors and lawyers come from? Two dentists on our office floor are mere youths. And there are young architects—I have seen them and have been one myself. There would be no less of them if competition were abolished forever.

I have tried to see something more in the institution than the erroneous principle (which we have fixed so definitely in the public mind to our disadvantage) that in order to develop five ideas you must have five architects. We are more resourceful than that, really. I am at pains, always, to assure the merely possible client that any intelligent architect can solve a problem in five different ways. "Try letting us compete with ourselves!" On the new public I should serve notice that an architect demands such share in the blessings of the democratic dispensation as shall appear in his receiving equally with the hod carrier an inevitable wage for an honest day's work.

CHARLES D. MAGINNIS.

Boston, June 30, 1919.

A City House Façade, New York, N. Y.
Frederick J. Sterner, Architect

Victory Loan Decorations in Chicago

THOMAS E. TALLMADGE, A. I. A., ARCHITECT-IN-CHIEF

THE three essentials of pageantry according to Claude Fayette Bragdon, and stated in his rather startling letter to the *New York Tribune* annent the recent New York decorations, are light, motion and color. To Chicago architects, Bragdon with his democratic vision speaks *ex cathedra*, so it was particularly gratifying to them that they had anticipated the dictum of the distinguished critic, and had based their entire conception of the scheme on the development of light, motion and color. It was also gratifying that the Liberty Loan Organization of the Seventh Federal Reserve district, realizing that the floating of the loan depended on its advertisement, decided first that the major advertising should be in decorating a certain part of the city where all festivities should be centered; and secondly, that a commission of architects should have absolute control over the arrangement and design of the decorations. The opportunity was magnificent as the site chosen comprised the entire length of Michigan Boulevard from Randolph to 12th street, one of the greatest streets in the world, over a mile in length, flanked on one side by grandiose and picturesque architecture, and on the other by Grant Park with the azure waters of Lake Michigan beyond.

The scheme as developed in plan was twofold: first the decoration with architecture, sculpture, trophies and flags of Michigan avenue named after its New York prototype, "Victory Way"; and second, the decoration in similar manner of Grant Park over an extent of two squares on the axis of Congress street, which thus was made the center of the entire conception.

The entire scheme in this manner conceived and carried out was lighted at night by the most extensive installation of decorative lighting since the Panama Exposition in San Francisco in 1914. The final result, especially at night with the wind moving the flags, was symphonic in its rondo of light, motion, color and form.

The decorative scheme of the Victory Way consisted in lining the west side of Michigan avenue with obelisks 45 feet high, each placed on the axis of an impinging street terminated by the avenue. The obelisks bore huge shields and were lined with vertical divisions filled between with small trophies. The permanent lamp-posts, 170 in all, were treated each with a figure of victory, 5 feet high, poised on the finial and in the center with a basket filled with greenery and flowers and draped with cross flags and a victory shield. From the top of each lamp-post to the fourth story window sills of the adjacent building stretched a sagging line from which were suspended 6-foot flags. The flags formed a bower or arcade the entire length of Victory Way, and were extremely effective.

One of the Four Fifty-five Foot Pylons

The decoration of the "Forum," within Grant Park, consisted of great pylons 55 feet high, a pair of each, bearing trophies, figures and shields, opposite Van Buren and Harrison streets. These were connected by curved colonnades to pavilions bearing globes with eagles and cauldrons, and ornamented with painted curtains. The pavilions were connected by isolated piers, each bearing a flagstaff with pennants and connected by heavy swags of cedar and by hedges of box and evergreens.

The central feature of the Forum, in

The "Altar of Victory" in Projected Light

fact of the entire decorative scheme, was the "Altar of Victory." This structure consisted of two towers, 85 feet in height, 60 feet apart; between them hung the jeweled curtain composed of Novagem jewels, from the tower of jewels of the Panama Pacific Exposition. The jewels covered not only the screen itself, but the face of the towers as well. Between the towers was a huge stage 110 by 50 feet, equipped complete with dressing rooms, curtain, lighting, etc. Here daily and nightly entertainments were given during the drive.

In style the structural portions of the decorative scheme plainly expressed its transitory character, and its humble materials — wood and canvas. All profiles were entirely of straight lines so that the mouldings could be built up of flat boards with the greatest possible expedition. There was no millwork whatsoever required, the reliance on color for final effect was determined at the outset so plain surfaces rather than detail were emphasized. The color scheme recognized the inevitable presence of red, white and blue, but built up a counter scheme of three shades of green, wine color and light buff. The latter formed the ground color for all structures. The field of all shields was vermilion, as was also the globes on which rested the little victories in the Forum, which of themselves were gold. Blue was used sparingly; red, white and blue were used in bands on the pavilions and on the wine colored curtains. The color scheme bordered on the riotous, but was kept in place by the greater extent of the buff ground and the wide expanse of the decorative scheme.

The night lighting was grandiose and truly magnificent: 180 flood-lights of 250,000 candle power each, located along the parapets of the buildings, lining the entire west side of Victory Way, bathed the area with a soft sea of light, while four giant anti-aircraft projectors of 200,000,000 beam candle power each made the jeweled screen a coruscating gossamer of flashing fire. From the tops of the towers, and from the giant cauldrons on the pavilions steam was emitted which was illuminated and colored by concealed light. Local flood lighting at special places illuminated greenery, statuary, etc., while far in the rear on the axis of the curtain seven great search-lights of 8,500,000 beam candle power each, made a fanlike background with auroral shafts of colored light.

To what extent the decorations actually augmented the sale of liberty bonds cannot of course be ascertained, but the reaction on the spirits of the vast crowds that were attracted was immediate and obvious. The joyousness, the spirit of triumph, the élan of the crowd was evident and owing manifestly to the pageantry, and only to that. This dispelling of the gloomy mood, with many the aftermath of war, and with many a chronic condition, made worth while many times over the labor and expense of the celebration. Moreover, the architectural disposition of the masses and units were designedly such as to keep before the

The "Altar of Victory" with Screen of Jewels

General View of Grant Park and Michigan Avenue

people's minds the greater glory of the city plan to come, with its proposed improvement of Grant Park. The decorations were of such magnitude as to furnish the Commissioners of the South Park Board a full-size model and a splendid criterion of scale for future work.

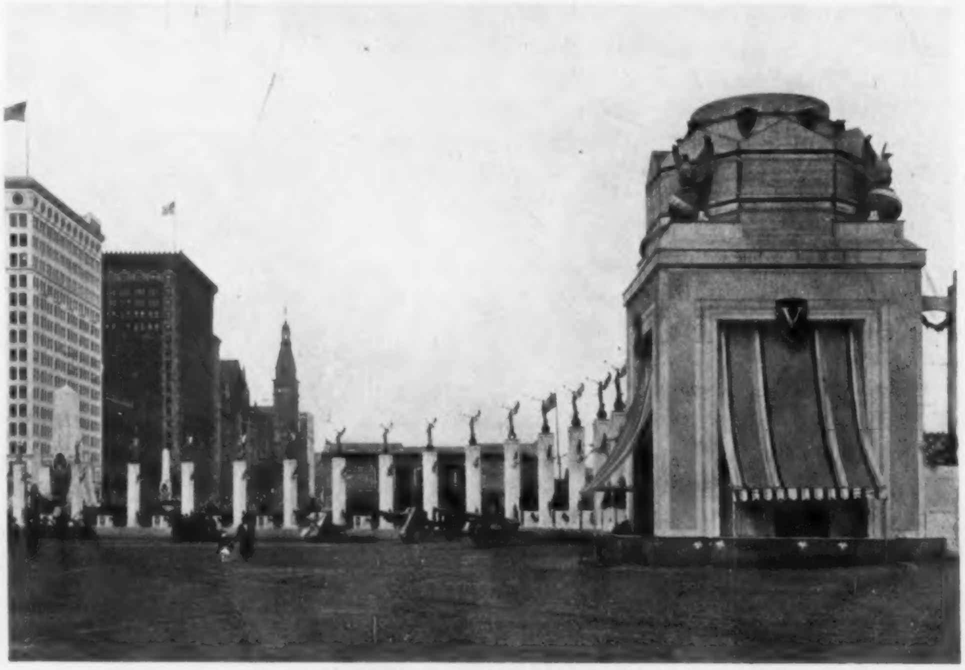
Thomas E. Tallmadge, of Tallmadge & Watson, was architect-in-chief and director of works. Assisting him actively in the design was Earl Reed, Jr., and in an advisory capacity, Pierce Anderson, of Graham, Anderson, Probst & White. George H. Maher was the member of the committee in charge of the lighting. Emil Zettler, sculptor, supervised and actually modeled most of the sculpture. Oliver Dennett Grover represented the painters, and to Herman Rosse, head of the department of design of the Art Institute, is due the color scheme. Elmer Jensen had charge of contracts and engineering. W. D'A. Ryan, of the General Electric Company, was the consulting lighting engineer and the lessor of the jewels. The lighting scheme as carried out is essentially his design. The committee worked without remuneration.

The history of the project is interesting as illustrative of what can be done in a short time. The architects were informed of their responsibility and their committee was organized on Tuesday, March 25. The drawings and specifications were made, competitive figures taken, and the contracts let except for the lighting on the following Sunday morning.

The loan drive opened on Monday, April 21, and on that day the Victory Way and Forum were dedicated, entirely complete, except for the demolition of the scaffold of the jeweled Altar of Victory, used in erecting the decorations.

The successful co-operation of the United States Government with a committee of architects, sculptors and painters, and the recognition on the part of the Government of the necessity of the fine arts in successfully consummating a huge enterprise, is one of the most encouraging signs of the new era.

At the close of the Liberty Loan Drive the city of Chicago took over the decorations for the welcoming of the home-coming soldiers. The Forum has been filled with stands and the flags now flutter welcome to the soldiers, and the little victories pipe unheard pæons of praise, and the pageantry of light, motion and color goes on, now as a mark of devotion to our boys and their work "over there."



Detail of West Pavilion and Curved Colonnade

ARCHITECTURAL AND BUILDING ECONOMICS DEPARTMENT

C. STANLEY TAYLOR, ASSOCIATE EDITOR

Developing Speculative and Investment Homebuilding Projects in American Cities

AT the present time probably the greatest single interest in the building field is being evidenced in connection with the building of large numbers of moderate cost homes in and near the more congested districts of cities. The speculative builder is again becoming active, and it is interesting to note that as never before he is studying the question of design and planning features which involve not only economy in construction, but the provision of more attractive homes and their grouping to provide architectural unity from the community viewpoint.

The reason for this increased interest is apparently twofold: first, because the home-buying public is exercising more discrimination in the purchase of dwellings; and second, that as the builder has studied the operations of recent years he has found that houses and communities of better than average design have been the more successful and have maintained values in a manner unknown to the monotonous stock-plan community. In representative cities of the country the wave of buying activity in the dwelling field has invariably started in the more attractive districts.

Therefore, in promoting city-housing operations which involve the construction of a number of houses for quick sale, careful study is being given to features outlined in following paragraphs:

Has the Architect a Service to Render in These Projects?

Before entering into a consideration of the various important factors in the promotion and development of these projects it may be well to clearly determine what service the architect has to render, and whether or not he can create sufficient saving or additional value to warrant the additional cost represented by his commissions. The value of architectural service in such projects depends entirely upon the architect's capacity for all-round service.

If his contribution is merely designing houses which have a degree of architectural merit, he has at this time no really valuable contribution to make. To be valuable to the builder the architect's service must include the ability to translate into the terms of home design all the needs and preferences of the type of families who will constitute the prospective buyers. He must assist in the financing of the operation by the presentation of attractive and practical designs, together with a careful study of equipment. Costs must be accurately determined in advance and every possible step taken to demonstrate to loaning interests the soundness of the project as collateral for loans which are difficult to obtain at the present time.

Owing to the difficulties of material production and shipment the architect will be called upon during various stages of building to provide logical substitutes for materials specified but unobtainable within reasonable time for one reason or another. It must be realized that time is the essence of profit in such a building operation and that if there is delay in waiting for materials, the cost will run beyond all bounds. It is evident that sound knowledge of the building material market is more necessary to-day than ever before — not only a knowledge of quality and price, but particularly of availability before specifications are drawn.

It will be seen, therefore, that the architect who is equipped not only with designing ability but with a knowledge of the business factors which enter into such a project has a valuable contribution to make.

Homebuilding Projects in and Near Cities

In foregoing articles the various phases of suburban homebuilding operations have been discussed, and later the question of apartment houses and multi-family dwellings will be taken up. In this issue interest will be confined to the one-family house, individual and group, particularly to operations within easy commuting distance of the business centers of the larger cities, consequently involving more or less congested districts and comparatively high land values.

The promotion and development of homebuilding projects involving the construction of a number of houses are usually carried out by an individual or corporation having in view a sound speculation with fair profits which may be earned without the investment of too great sums of money. This type of speculative building investment is usually and properly carried out on a margin basis — that is, through a system of financing involving building loans and permanent mortgages.

It is generally found that money is more easily available for housing developments in cities rather than in suburban districts, and at the present time financial interests are beginning strongly to en-

courage the provision of relief from the general housing shortage by providing building loans.

The financing of these operations usually entails the provision by the owner of an amount of cash equaling about 30 per cent of the cost of the operation. The first step is to obtain the land free and clear of mortgage or other encumbrance. Plans and costs are then completed and application made for a building loan from individuals or institutions which have money available for this purpose. Building loans are usually granted for a period of one year or for a period to cover the time of building and an agreed time after completion such as six months or one year. Based on eastern United States mortgage charges, the interest on a building loan is usually 6 per cent. The cost of obtaining the loan, in addition to the interest for the entire period (deducted from amount loaned), varies according to the source from which the loan is obtained. Where the loan is obtained from institutions of good standing, the charges in addition to interest vary from 1 to 2½ per cent of the principal amount. This charge is to cover the cost of overhead and handling chargeable to the transaction and a banker's profit. As most loans are obtained through mortgage brokers, this service constitutes a similar additional cost.

When building loans are obtained from individuals, a more liberal loan, sometimes up to 70 per cent of the cost of the operation, may be obtained. Generally, however, this involves the payment in one form or another of a bonus which in some instances brings the cost of obtaining the loan as high as 15 per cent, including bonus, broker's fee and other charges. At the present time there is no direct method of controlling extortionate building loan cost charges. It is clearly a matter of *caveat emptor*.

Another and more satisfactory type of financing the building operation is that known as a building and permanent mortgage. As the title implies, this is constituted by an agreement between the mortgagor and mortgagee through which financing is provided during the building operation, and an agreed amount is finally left as a regular first mortgage against the property. The loan of this type represents less actual cost to the applicant, as instead of two operations with separate costs and brokerage fees one agreement covers the entire transaction.

Building loans are usually provided in three or four installments as the work progresses and certificates are issued. The first payment is generally made on each house as the cellar excavation is finished and foundations completed. The next payment is made when the roof is on and final payment after rough plaster work or the building is finished.

At this point it might be well to refer to a new type of building and permanent loan, particularly applicable to city housing operations and which has many points in its favor. This is what is known as the amortization mortgage, and its general adoption as a method of financial building operations is at present being strongly urged by many loaning institutions. In many recent instances large loans have been made on this basis.

The general principles involved in the amortization mortgage are: (1) a more liberal loan; (2) extension of the mortgage for a longer period than usual; (3) annual payments in reduction of the mortgage until it has been paid off. Often when it has been brought down to approximately 60 per cent of the value of the property it is transferred to another loaning institution such as a savings bank. This is usually done by an assignment of the mortgage.

There are many arguments in favor of this form of financing building operations. Through the medium of the amortization mortgage sometimes as high as 80 per cent of the cost can be obtained on a first mortgage loan. This makes easier the financing and developing of a building project and places the burden of reducing the mortgage principal against the rental income, and in many cases against the increment in value of the building.

House Types and Allotment of Land

Having purchased a tract of land, of varying dimensions depending upon the size of the operation, the prospective builder immediately faces the dual problem of house type and location on the land. Aside from the profit which may ultimately be shown in the increment of land values on unbuilt sections of the property, the builder has to look for a reasonable and quick profit on his operation which may result from the immediate sale of the houses built. The obtaining of building and permanent mortgage loans on the houses is in one sense a preliminary sale of the buildings, — that is, the builder, in order to obtain his financing, must be able to present his plans in a manner which will convince financial institutions of the feasibility of the project. At this point, therefore, the services of a good architect to carefully lay out the entire project will prove of important value.

From the viewpoint of the speculative builder and the real estate operator, the question of allotment of land to each house is determined largely by land values. It is well known that to be economically sound the cost of the improved land unit must not exceed 20 per cent of the cost of the house. This is the basis upon which the average building loan association makes its valuations, and the reason is fairly evident. If land of greater

value is used for the erection of moderate price dwellings, such value has usually been created by intensive use and by the development of business buildings and multi-family houses in the neighborhood. As soon as the land is used for an individual dwelling, its potential value is in one sense destroyed, — that is, it cannot be used for any other purpose until the increase in land value in that neighborhood brings the value of the land used for dwellings up to a point where the value of the building on it can be discounted or charged off as part of the real land value. It can be seen, therefore, that once a house is built the land value becomes only relative. If land, bearing too great a proportionate value to the cost of the house is used, a percentage of the present value is destroyed, while taxes and interest on land investment bring up the cost of maintenance to a point too high for the living space provided.

The Row or Group House

We find, therefore, that the successful method which is used in our larger cities to keep the ration of land value in its proper relationship to the cost of the building is the construction of row or group houses. The determination as to type is made in the following manner, based upon definite cost figures :

If we assume that a builder is considering three tracts of land, all of which have been purchased at various prices determined by general conditions and the character of the neighborhoods in which each is located, the various necessary improvements, such as streets, sidewalks, sewers and other mechanical improvements having been made and charged to the cost of the land, the square footage of each plot is determined, and by division into the total cost of the plot a unit cost per square foot is established. We may also assume that these plots of land available for building are located in neighborhoods where realty values show a considerable variance, owing to varying ratio of congestion and class of occupancy.

In figuring the square foot land cost in each plot, we may find for example that in plot "A" (a fairly congested district) the unit land cost is 60 cents a foot; plot "B," 40 cents a square foot and "C," 30 cents a square foot. In analyzing the general characteristics of the neighborhood in which plot "A" is located the builder determines that the type of house which will sell in this neighborhood must not exceed $6,000 to $6,500 as the asking price. This determination is based upon various factors, including the average earning capacity of those who live in and may be expected to buy homes in the particular section where plot "A" is located. At this price, after deducting the builder's profit (usually figured at about 20 per cent) and the cost of the land, it may be seen that there is left about $4,000 to be spent in the construction of the house. To keep the cost of land in fair ratio to that of the building it may be seen that such cost should not exceed $800 to $1,000. Having $800 to be applied to land cost, at a unit value of 60 cents per square foot, the builder finds that he should allot to each house less than 2,000 square feet, or a lot less than 20 by 100 feet in dimension. This condition at once limits the type of building to the row house on lots of 18- to 20-foot frontage and varying depth, or the use of more land for a more expensive dwelling if the character of the neighborhood permits.

In one of the more successful row-housing developments of New York City the unit land value, using 100-foot lots 20 feet wide, was found too high. This was overcome by cutting short streets at intervals through a long block and allowing a lot only 20 by 60 feet for each house. Houses were faced on alternate short streets instead of on the long avenue, thus providing narrow roads at the rear of each lot to be used for delivery and garage entrance. In this manner additional facilities were provided and the unit cost of lots cut down to a sound basis.

It will be seen that the less the unit cost per square foot of improved land the greater can be the area of land allotted to each house of equal cost. There can therefore be established in each instance a safe maximum of land allotment to each house of given cost.

From the viewpoint of selling value, the group house offers a particularly interesting problem and one which the architect may be instrumental in solving. The day of the monotonous row house is passing and there is an increasing demand for architectural treatment which may provide unity of mass and a certain element of æsthetic value which will give a touch of individualism to the community and to each house.

Selling Value of Interior Equipment

Through a careful analysis of many city housing development projects, particularly those involving the row house, it has been found that from the business viewpoint the more successful houses are those where careful study has been given to interior design and equipment. This means study not only from the average viewpoint of design, but from the specific viewpoint of the type of family that will be interested in purchasing the houses.

It is interesting to note that there exists a definite form of social activity among people having fairly comfortable incomes resulting from the payrolls of commercial and industrial institutions.

This is particularly true in neighborhoods populated by people of foreign extraction, which represent the second or third generation of family development in America. Social activities in this class are confined largely to the home and are contributed principally by the woman of the family. Therefore in purchasing homes it was found that the woman's interest largely governed the situation, and that that interest was influenced strongly by the potential opinion of friends rather than the immediate demand of family comfort.

Two features which influenced purchasers were in the equipment of the kitchen. Here a highly attractive and interesting gas stove was provided, together with porcelain sink and porcelain tubs with white enameled covers. The kitchen floor under the stove and sink was tiled and all the apparent features of convenience and sanitation which would show most effectively were included. These kitchens sold more houses than any other feature. Again the bathroom was made a special feature, being more than usually large and having tiled floor and side walls with special shower compartment separated from the rest of the room by a large marble slab. It is a strange but interesting fact that in some classes of dependable home buyers social status is largely set by the equipment of the kitchen and bathroom. In these houses the electric fixtures were of simple and inexpensive design, and through the medium of simplicity considerable money was saved in order to offset the extra expenditure in bathroom and kitchen.

The Individual Garage as a Selling Feature

No city housing development is complete today without some provision for garage space. At the rate of present production, at the end of this year, there will be about 7,000,000 automobiles owned by families in this country. This means that one out of three families possesses a motor driven vehicle, and a very large percentage of these are inexpensive cars which are maintained only by careful economy. The maintenance cost of an automobile, therefore, is entering into the budget of many of our average American families, and in purchasing a home there is certainly an interest in garage space in view of the high cost of public garages and because of the interest of the average man in having a place where he can keep his car and care for it.

There are several interesting methods for providing them in extensively developed residential sections. The first is setting aside a plot of land near the houses on which a large number of small unit garages are built in rows with an entrance grade. In some cases it is found that this operation will be handled by some person in the garage business who will also maintain a small repair shop and a gasoline station on the property. The second method is the provision of alley entrances and placing the small garages in the rear yards. A third method is the provision of individual garages for part of the houses at the end of lots where room can be found, which are sold and maintained on a co-operative basis by home owners in the community. The latest and perhaps a more practical method of providing garage space is to actually place the garage in the cellars of row houses. The average row house for purposes of economy is placed well up on a foundation, requiring excavation of probably not more than 3 or 4 feet. Ground is usually terraced up for small yards in front, and window openings are provided in foundation walls to light cellars. It has been found within the scope of the average building code to place the garage at the rear of the cellar with the roof of the front portion of the garage extending some 4 or 5 feet out of the house and forming a back porch. A driveway from the rear entrance and having a slight grade down to the cellar floor level makes it possible to drive the car directly into the garage underneath the house. This method represents a saving in cost, using cellar space which otherwise is of little value.

It is safe to say that garage space adds, at least, $10 per month to the rental value of a house, which means that it adds $1,000 to the value of the house. It is evident that by an additional expenditure of $500 on a house costing $5,000 a garage may be provided which offers a sound investment both from the speculative and home-owning viewpoints.

The Organization and Administration of an Average Real Estate Development Company

PRACTICALLY all suburban and city residential developments are carried out by companies (usually incorporated) and created specifically to carry on activities of this nature. In view of the rapidly increasing interest in building and development projects of this nature, it will be of interest to follow through the organization of such a company and to touch briefly on various important points of administration.

In the first consideration, if a building development of residential type, or a land subdivision project of any size is contemplated, there will undoubtedly be times when it will be necessary to approach various financial institutions for building

and permanent loans. It is important, therefore, that the operation be handled by a corporation, rather than an individual or partnership, as loaning institutions always prefer to do business with the former. In loaning on individual bond and on property owned by an individual, there are many times that the death of the individual or other complications which may be of a business nature will tie up the property and cause various legal complications.

Therefore, for the handling of a realty development, it is well to incorporate in order to establish a better basis for business relations. Through the medium of incorporation and issuance of stock, additional funds may be provided for use in the activities of the company.

Perhaps the easiest manner in which to describe the organization of such a company is to select and detail the actual experience of one successful organization, an average realty operating company such as might interest the usual type of investor.

The particular corporation in question, which we may call the City & Country Realty Co. was formed for the purpose of buying acreage property, dividing it into lots, putting in improvements, building houses and selling lots or houses in accordance with the wishes of purchasers.

The manner in which the company came to be formed was as follows:

A real estate broker, located in a large city, was offered, by the owner, a farm of 100 acres located near a residential town within a few miles of the city. At the time, the railroad which connected the residential town with the city was getting out plans for the electrification of the intervening trackage, which meant that within a comparatively few months excellent transportation service would be established. A trolley line from the station in the town passed directly by the farm in question and as the asking price for the farm was only $300 an acre, the possibility of ultimately developing the land into a residential section for commuters from the city appealed strongly to the real estate man.

After discussing the matter with several friends, arrangements were made by which each of three men contributed $10,000, making up a total of $30,000 for buying the land. This was done and the title taken in the three names, the property being clear of mortgage or other encumbrance.

Several months passed, and when work was definitely started on the electrification of the railroad it was decided to proceed with the development of the property. As none of the three owners had sufficient capital, the organization of a development company was undertaken.

Accordingly the matter was taken up with an attorney and arrangements made to incorporate for $150,000 in order to provide for the purchase of the land by the new company, the improvement of a portion of the land, and the construction of some houses to add interest to the operation. The company was duly incorporated for $150,000, made up of 1,500 shares of common stock, non-assessable, at a par value of $100 per share. For the purchase of the land 500 of these shares, representing a par value of $50,000, were immediately given to the three owners, and title to the land was transferred to the new company. At this point the condition of the City & Country Realty Co., Inc., was as follows:

Capital stock 1,500 shares @ $100	$150,000
Stock issued for land 500 shares @ $100	50,000
Stock available for sale 1,000 shares @ $100	100,000

The various formalities having been carried through, such as the first stockholders' meeting, the election of a board of directors and the election of officers, the three original owners of the property occupied the respective positions of president, treasurer and secretary of the corporation and constituted the board of directors.

In order to get operating capital it was decided to offer for immediate sale 500 shares of the stock and to retain the balance of 500 shares as treasury stock to be sold later when additional development was contemplated. It was found, as is often the case, that in the sale of this first block of stock, before improvements had been made to the land or any real activity started, a stock bonus or a commission must be given as an added inducement for the first cash investment. A stock bonus of one share for every four shares purchased was therefore offered the first investors.

Immediately then before offering any stock for sale an application was made to a local financial interest for a loan of $16,000 on the free and clear property owned by the company. This loan was obtained and the cash placed in the treasury of the company to begin operations. The next step was the retention of a landscape architect to lay out the streets and lots, together with various parking and planting features. After careful study this was done and an illustrated prospectus was prepared showing method of subdivision; approximate cost of improvement and sales prices of lots together with other data which might interest an investor.

The first issue of stock was then offered for sale to various investors with whom the officers of the company came in contact, and in a few weeks the entire 500 shares were sold, netting to the company, after deducting bonus, the cash sum of $40,000, to add to that already realized on the mortgage which had been placed on the property.

It might be noted that this mortgage was in the form of a release-clause mortgage. This meant

that arrangements had been made to pay off on short notice the principal sum of the mortgage as it applied to any lot in the subdivision. In other words, the mortgage was distributed over all the lots and could be paid off to render any of them free and clear when desired.

The condition of the City & Country Realty Co., Inc., at this point, was as follows:

Owner of 100 acres unimproved property paid for in stock and mortgaged for $16,000 (release-clause mortgage).

Stock still in treasury and available for future sale; 500 shares		$50,000
Cash in bank ready for development purposes; proceeds of mortgage	$16,000	
Proceeds of stock sale	40,000	
Total cash		$56,000

(From which must be deducted items such as cost of obtaining mortgage and operating expense to date.)

At a special stockholders' meeting, held for the purpose of having two additional directors elected from among the new stockholders, this action was taken and the board of five directors then decided to proceed immediately with the first stage of the development. Small salaries were voted to the officials who were called upon to give considerable time to the business of the company.

The next action taken was to stake out the first section of lots near the entrance to the property. Work was immediately commenced on road building and mechanical installation in this section. A small sewage disposal plant was built, as there were no sewers near the property, and water and electricity were brought in. The construction of ten houses was started near the entrance to the property and an active sales campaign begun.

The available operating cash of the company was used in approximately the following manner:

Cash available	$56,000
On sewer installation for first section of the property, grading streets, etc., there was spent	28,000
Ten houses were constructed at a cost of $6,000 each — 60 per cent of which was borrowed on mortgage. To do this the release-clause mortgage was paid off the property built on, the sum of $2,000 being paid on the principal of $16,000. The net cost of this operation to the company was	26,000

In the meantime electrically operated train service had been installed from the town to the city. With some judicious advertising considerable interest in the property had been aroused, so that lots were selling where improvements had been put in. As payments were made and the houses sold additional sections were improved and some further building done in the new sections. Arrangements were made with financial institutions so that the further inducement of available building and permanent mortgage money could be offered to lot purchasers. As a result many of the buyers began construction on their own account.

It was found that after taking out land for streets and parking spaces an average of seven good sized lots were available for sale in each acre. These were placed on the market after improvement with streets, etc., at a price averaging $850 per lot, or a total of $595,000. The cost for roads, sidewalks, sewers, water, etc., with the original cost of land, was about $550 per lot, leaving a gross profit of $210,000 when all the property was sold, out of which the selling and administration costs were deducted. The actual profit on this operation netted to the company about $100,000 in three years, or an average of over 30 per cent per year on the $100,000 worth of stock originally issued.

When the operation was well under way the additional $50,000 worth of stock which had been retained in the treasury was sold for the purpose of purchasing two large adjoining tracts of land before the price was greatly increased. After a year, when the original development was showing rapid growth, one of these tracts was sold outright at a profit of well over 100 per cent, and the other tract was sold to another development firm at a still greater profit but on the following basis.

No cash was required for the purchase of this property, but the buying company agreed to take title and give back a release-clause mortgage against the property for an amount practically three times the original cost to the City & Country Realty Co. This could be done because the rapid building up of the first development had greatly increased the value of the surrounding land. It was further agreed that the purchasing company instead of putting up any cash for the purchase of the land would agree to spend a certain amount in putting in streets and other necessary improvements, which would become the property of the mortgagee in case the agreement was not lived up to in any manner. In this way, as lots were sold by the new company, the City & Country Realty Co. received their *pro rata* payment for releasing the lots to the new purchaser.

In regard to the stockholders in a development company of this nature, it is wise to refrain as far as possible from selling stock in small blocks. The small holder usually has less business vision than the larger investor; is more prone to cause trouble over fancied wrongs and in general will impede and block progress because of a very great solicitude for his small investment.

In many of the successful realty development companies the principal investors are men whose very business activities or professions make possible valuable contributions to the success of the company. Illustrative of this fact is that one of the most successful realty development companies of which the writer knows has as its principal stockholders and directors a real estate broker, a banker, a builder and an architect.

The Standardization of Building Materials

By D. KNICKERBACKER BOYD, F.A.I.A.

ONE sometimes hears a captious critic or "conscientious objector" decry standardization as a fetish worshiped by efficiency fanatics. Such a one speaks as though every standard was expressive of finality — a check to individual accomplishment, a stifler of creative imagination.

These are misconceptions — so far as standardization of building construction is concerned — which I earnestly desire to see set right. Standardization in its application to the erection and equipment of modern structures is as essential to successful results as is the standardization of time, weights and measures.

The results to be attained through standardization of materials and methods used in building, and of sizes and space requirements, might be broadly summarized as follows:

The elimination of a tremendous amount of individual effort, time and expense in specification preparation and detail drafting.

The saving of lost motion and waste in the extraction, production and application of materials and the manufacture of equipment.

The permitting of industries to keep production well in advance of demand and assuring more constant employment of workmen.

The reduction in the variation of types, sizes, patterns and finishes which together with carrying needlessly large stocks play an important part in contributing to the high cost building.

The appropriate use of materials conforming to known characteristics, or limitations in their nature, methods of production and manufacture.

The proportionate lessening of cost of construction and reduction in maintenance through knowledge of such suitability.

The wider use, through such economy, of materials and buildings best adapted to improve living and working conditions, lessen fire risks and lower rentals.

The assurance of a high, uniform degree of safety and efficiency during and after construction, including adequate day lighting, artificial illumination, sanitation and all other factors which make for the health, comfort and convenience of the occupants of buildings.

The making possible of a closer co-operation between architects, engineers and other constructionists, and the men who produce, furnish and install material and equipment.

Architects have all too frequently not sought the co-operation of industries and associations of manufacturers in the solution of problems of production and application, and have not sufficiently recognized established trade customs, classifications and terms, or encouraged their wider use and improvement.

On the other hand, many industries and manufacturers have not sought the co-operation of architects and other constructionists to the extent that they should. They have, it is true, often tried to please architects by catering to the whims and caprices of some without ascertaining the real needs or desires of all.

This, often combined with needless variation in type or pattern made only in the effort to afford "selling talk," has caused whole branches of the building industry useless expense and many difficulties in the merchandising of their product, has filled stores and shelves with surplus stock and contributed to the high cost of building.

Prior to action by the Government during the recent war in curtailing the production of certain building materials and in standardizing others, there were in existence several established standards for certain basic building materials, and in some cases for their safe and efficient application.

These had been developed through years of study and strenuous labor on the part of organizations, institutions and other bodies, including: the American Society of Civil Engineers and other engineering societies, the governmental departments, technical institutions and schools, fire prevention and safety associations and commercial bodies.

Many of these were finally embodied in standards put forth by the American Society for Testing Materials, as to materials; by the National Fire Protection Association, as to fire and life safety, and by the National Safety Council, as to safety in industries and in general. Architects should familiarize themselves with these standards, together with those of the Illuminating Engineering Society and others, as their use will be of the greatest possible advantage to all concerned.

With respect to building materials, any standardization should take into account the following factors:

1. Geologic Origin and Availability.
2. Extraction, Production and Manufacture.
3. Suitability for Intended Use.
4. Methods of Application, Alone or Combined with Other Materials.
5. Maintenance and Preservation.

Architects have been and always should be the leaders in newer and more effective uses of mate-

rials and their wider application to various forms of building construction. But these uses should be not for appearance only, but should be considered in combination with utility, appropriateness, economy and permanency.

The necessity of a better knowledge of building materials and broader understanding of their source and application became more pronounced through war demands. The activities toward standardization then inaugurated, it is hoped, will be taken up and carried forward by architects as leaders in times of peace.

The unfortunate practice of calling for all materials, notably the products of nature or those dependent upon heat for their hardening or transmutation, "to be of first quality only, free from imperfections, blemishes, defects, etc.," works an economic hardship all along the line. Trite as it may sound, it seems, nevertheless, necessary to reiterate this fact without going into details of the many phases of the subject. These begin with building code requirements and extend themselves through housing and sanitation laws, rendering improvements in existing conditions more costly and difficult, affecting fire prevention and safety, and eventually increasing the cost of buildings and maintaining rentals at higher levels.

If only hard burned bricks, as an example, were to be used in building construction, approximately one-quarter of all the bricks produced would have to be thrown away. In the process of burning that proportion of bricks, being necessarily remote from the fire, cannot be otherwise than "light burnt" or "salmon" bricks which are suitable for backing up, for non-bearing interior walls and for other places where not exposed to the weather or subjected to great weight. The question of size has been, and is being, worked upon; but brick machines "wear large" before they become worn out, and some bricks burn smaller than others so that, even though standards of size have been established which, however, are not conformed to as yet throughout the country, the jointing becomes a determining factor. Eventually diagrammatic illustrations will portray the various jointings and bonds so that it may be none the less desirable to use a "Flemish" bond, an "English" bond or any other, because it has become standardized beyond peradventure of dispute. Mortars, as well as joints, instead of varying in almost every city of the country, may surely, within climatic ranges or geographical zones, be prescribed according to standard formulæ, so that varying individual judgment shall not prevail nor need to be given under customary conditions.

Similar comments might be made as to lumber, except that here associations and large organizations throughout the country have worked out many standards, chiefly known as "Grading Rules" which are gradually converging into few standards. Great need exists, however, for bringing all of these into harmony, and for standardization in the matter of nomenclature alone.

What opportunities unfold themselves to the millwork industry and to architects co-operating with it! If the odium attaching to the word "stock" in this industry can be overcome, it will be because the industry as a whole will accept from the architects, if they will give it, such co-operation as will make commonplace only that which is good in the way of doors, windows, trims, cupboards, dressers, mouldings and other millwork.

What an economic saving will surely result to all concerned — not losing sight of the betterment in taste on the part of those who do not, or feel that they cannot, employ an architect — when the above, in addition to mechanical features like window boxes, have been standardized. In that case, the country over, a mill could turn out a suitable frame for a given type of construction with choice of moulds, but without a separate detail being made in every architect's office, involving variations and increased cost in every office and mill.

Take as another illustration slate and its uses. According to the U. S. Geological Survey: "It has been suggested that a failure to recognize a certain minimum thickness for slates has been unfavorable to the industry; that some producers are in the habit of splitting their slates too thin, and that the insistence by architects and the general public on thicker slates would result in much less breakage, a higher standard of splitting and sorting slates, and the marketing of a product of higher grade. The minimum suggested is 3/16 of an inch."

This thickness has now been established as standard by the slate industry, and together with a standard 3-inch lap should be insisted upon by architects and owners. As for sizes of slate, one might think that standardization would require the use of one size on any given roof. Quite the contrary, for it is desirable, in view of the varying sizes of rock from which slate is produced, that all available material be consumed and that, therefore, say three sizes of slate be specified for a roof, beginning at the eaves with the largest for about one-third up and so on. This refers to the "commercial" gradings of slate as distinct from the variegated and graduated "architectural" roofs, but indicates that through proper understanding of materials, effects may be obtained which might otherwise not be considered as possible of accomplishment. It is also a fact that when the wishes of architects are more thoroughly appraised, it will be found that materials may be produced for

which the æsthetic need has long existed, as in the case, for instance, of the gray slate recourses in Pennsylvania, from which rough and most attractive textures can be obtained and in colors which weather quite different from "black," which name has erroneously been applied to slate roofing from this section.

In the case of slate used for structural purposes requiring a closer and more compact grain than roofing, it has been too frequently the custom to specify the slate to be "free from veins or ribbons," or to say that "a few ribbons not detracting from the appearance will be acceptable." In marble, selections are commonly made to secure the most veinings; but in slate because some rock, only about 20 per cent of the total, however, can be cut from between the "ribbons," or veinings, the custom of specifying "clear" obtained to a considerable extent in the past. This is changing, however, on the same principle that it is sound economics to order sirloin steak for general consumption and tenderloin only on special occasions.

In slate fixture work the machinery and customs of the trade have established standards of finish which should be appropriately specified to avoid unnecessary labor and expense of providing "honed" finish when the standard sand rubbed finish is quite adequate for the purpose intended.

In the case of arrangement, size, thickness and details of construction for shower bath and toilet room enclosures, and other such fixtures where slate or other materials might be used, the standards established by the U. S. Government, through the Board on Uniform Plumbing Specifications, could well be followed to the economic and practical advantage of all parties. Not only could these be referred to in specifications by plate numbers, affording equable conditions in estimating; but if these, supplemented by any necessary data of the structural slate-producing industry could be settled upon as definite standards, it would place architects in the position of contributing to the stabilization of industries and eliminating delays.

With such standards to follow, the quarriers and artisans in the slate industry, likewise in other industries affected, could proceed with production uninterruptedly (instead of laying men off, as sometimes has to be done), so that material accumulating could the more promptly fill orders later.

In the matter of tile work, no one who has not actually visited a tile plant and kilns can begin to realize the enormous amount of hand work, burning, handling and sorting which is bestowed upon the regulation white tile, which when finally in the wall or on the floor has such a machine made and uniform appearance.

One cannot but wonder when viewing the large force of people sorting tile why the slight variations in shade, said by some to be over forty, should not be taken advantage of on the score of appearance alone, instead of causing this labor and expense to be put into a process that custom seems to have established as necessary. Does the end justify the means?

And if it were understood what countless numbers of bases, corners, angles and other parts must be made to accompany each size and shape of tile, the present range of choice in the units comprising a plain white field would be reduced to the rejoicing of all concerned.

And just as it is impossible to produce all perfect specimens and uniformity of size in any product resulting from concentrated heat, so would the situation be immeasurably helped if so-called firsts, standards and seconds in tile were to be appropriately used, assisted by the industry in making possible the proper identification after classification of each grade. Truly it is a waste of energy and money to use the best specimens of kiln production in lining an elevator or other shaft or similar features in a building, or portions where light and sanitation are as well served by using the grades remaining after the selection of those more nearly approaching perfection has been made.

Many specifications, some of them governmental, call for the metal lath on all suspending ceilings and for all cornices, beam work and false work to be "supported and secured in a rigid, thoroughly satisfactory and workmanlike manner to approval." In consideration of this all too frequent practice it is no wonder that equitable conditions do not always prevail even in the estimating, and that controversies arise as to the interpretation of these words and other terms which are used instead of definite instructions or direct reference to a standard to be followed.

For such work there are standards in existence which might be followed for the suspending of ceilings; for instance, one of them is part of the latest Building Code of New York City, which contains as complete and fully detailed requirements for this construction as could be found anywhere.

An association of manufacturers has issued a handbook which also illustrates and describes this form of construction. Local associations of the Building Trades Department of the American Federation of Labor have issued "Uniform Lathing Specifications," in which are incorporated some excellent provisions for such construction. With these and other available standards for this type of construction, so important from the standpoint of durability and safety, why should not every specification make definite reference to one of these as the method to be followed?

EDITORIAL COMMENT

THE field of commercial and industrial building is one of particular interest to architects at this period of reconstruction for several reasons: the resumption of building in this type of structure took place sooner and on a larger scale than in any other; the tremendous demand for increased manufacturing space during the war prompted the invention of simple and quickly erected methods of construction; the rapid progress in manufacturing methods to meet modern conditions of business has brought about greater changes in a similar space of time in the planning and equipment of industrial buildings than in any other type of building, and the successful architectural treatment of many recent factories has made it evident that the opportunities for the development of this type of structure have been largely neglected by architects.

The fact that more industrial buildings have not been designed by architects is largely due to the lack of interest the profession has shown in the work. As a consequence this very fertile field of design has been served by the engineer or contracting engineers, the latter virtually contractors, who have built up in many cases large and powerful organizations from the profits of this type of work exclusively. With the growing importance of industrial building and the increasing numbers of people who gain their livelihood from industrial pursuits, the physical character of these buildings, because of their important influence in the community, is a matter of considerable concern.

Industrialism is one of the dominant notes of our modern life, but so far, architecture, which in past ages recorded in permanent form the dominant characteristics of its time and people, has not exerted any marked influence in the buildings housing our modern industries. The opportunity is no less favorable than those of earlier days. It needs only a realization of its possibilities by architects of to-day to develop application of architectural principles that will be a strong bond in uniting the profession and business interests.

Commercial design is not such a simple matter that it can be handled offhand by any architect, and it cannot be thought that it requires no particular skill. It demands a type of service of a most exacting character, and success cannot be counted upon without an energetic study of the problem in all its phases, and an extensive and sympathetic understanding of manufacturing methods.

Industrial buildings entail primarily practical requirements, — safe, permanent and economical construction, and the efficient installation of mechanical equipment. They are investments which must show earning capacity to be successful. Appearance is incidental from the manufacturing viewpoint; it is, of course, eminently to be desired, but efficiency of the structure cannot be sacrificed for it, nor can it justify any appreciable addition to the cost of the building.

These conditions present an opportunity for service that the architect is especially capable of rendering. He has the type of mind that can grasp the problems connected with planning a building to fit the operations of manufacturing, and through the possession of a better appreciation of structural forms than the engineer, he can provide interest and beauty to the walls and mass of an industrial structure. There are, however, many features of the engineer's handling of the problem that architects may study with profit, for it is in those respects that corporations have been impressed more favorably by engineers than by architects. Good business methods, speed in construction, directness in securing results, are the contributions engineers and contracting concerns have made to industrial building, and it is only by a combination of these qualities with architectural planning and design that architects can be successful in industrial work.

During the war a new conception of the responsibility of manufacturers to their employees took definite form, and the general acceptance of the principle, that good working conditions, well lighted buildings, opportunities for social activities and proper housing are essential to satisfactory labor conditions, holds great promise for the future of American industry. Good architecture in the buildings which house so vast a proportion of our population during working hours will likewise exert an influence of great benefit to industry and its workers alike. It must be kept constantly in mind that all industrial work is, however, of a very practical nature, requiring that utility be considered of prime importance and that beauty must come from the structural elements. Good mass, proper disposition of structural members, pleasing skyline and due regard for color and texture of materials will produce interesting buildings at no greater cost than for the usual utilitarian design.

The only way of stopping the encroachment of contracting and other interests is to serve the owner better and more efficiently than do the contractors. If architects can point to buildings better planned and constructed, more economically built and of better architecture than those now produced by others, and carry on the business aspect of the work expeditiously and without friction, they will quickly take the lead.